



TEST REPORT

Test Report No: 2AFW2DM8100 Test Report No: May 27, 2022 Testing laboratory: SHENZHEN TONGCE TESTING LAB Testing location/ address: TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People Republic of China Applicant's name: Shenzhen DZH Industrial Co., Ltd Address: 3th Floor, YiTuo Mike Industrial A building, Bu Yong Industrial I zone, ShaJing, Shenzhen, China Manufacturer's name: Shenzhen DZH Industrial Co., Ltd Address: 3th Floor, YiTuo Mike Industrial A building, Bu Yong Industrial I zone, ShaJing, Shenzhen, China Standard(s): FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013 Product Name: N/A Model/Type reference: DM8100 Rating(s): DC 3V(2*AAA Battery) Date of receipt of test item May 19, 2022 Tested by (+signature): Aaron MO Check by (+signature): Beryl ZHAO		ILOI KEI OKI		
Testing laboratory: SHENZHEN TONGCE TESTING LAB Testing location/ address: SHENZHEN TONGCE TESTING LAB TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People Republic of China Applicant's name: Shenzhen DZH Industrial Co., Ltd Address: 3th Floor, YiTuo Mike Industrial A building, Bu Yong Industrial I zone, ShaJing, Shenzhen, China Manufacturer's name: Shenzhen DZH Industrial Co., Ltd Address: 3th Floor, YiTuo Mike Industrial A building, Bu Yong Industrial I zone, ShaJing, Shenzhen, China Standard(s): FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013 Product Name: N/A Model/Type reference: DM8100 Rating(s): DC 3V(2*AAA Battery) Date of receipt of test item	FCC ID:	2AFW2DM8100		
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	• • •	May 19, 2022 ~ May 27, 2022	(C)	
Check by (+signature): Beryl ZHAO	Tested by (+signature):	Aaron MO	Amon Mage	
	Check by (+signature):	Beryl ZHAO	Boy(STOT)	
Approved by (+signature): Tomsin	Approved by (+signature):	Tomsin	Tom Sails si	

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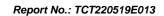




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1. General Product Information

1.1. EUT description

Product Name:	2.4G Wireless Mouse		
Model/Type reference:	DM8100		
Sample Number:	TCT220519E013-0101		
Operation Frequency:	2405MHz ~ 2470MHz	(C)	
Number of Channel:	40		
Modulation Technology:	GFSK		
Antenna Type:	PCB Antenna		
Antenna Gain:	0dBi		
Rating(s):	DC 3V(2*AAA Battery)		

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.

1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	3	2422MHz	5	2440MHz	7	2460MHz
2	2413MHz	4	2430MHz	6	2450MHz	8	2470MHz

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

кероп по	1C1220519E013	

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
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
Band Edge	§15.249 (d)/ §15.205	PASS
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.





3. General Information

3.1. Test Environment and Mode

Operating Environment:						
Condition	Radiated Emission					
Temperature:	25 °C					
Humidity:	55 % RH					
Atmospheric Pressure:	1010 mbar					
Test Mode:						
Engineering mode: Keep the EUT in continuous transmitting by select channel						

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
Adapter	JD-050200	2012010907576735	/	JD

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.

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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: TCT Testing Industrial Park Fugiao 5th Industrial Zone, Fuhai Street, 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 ± 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

Standard requirement:

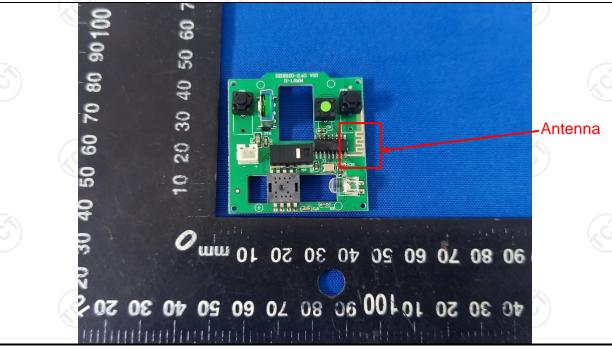
FCC Part15 C Section 15.203

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.

E.U.T Antenna:

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

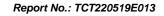




5.2. Conducted Emission

5.2.1. Test Specification

<u> </u>				
Test Requirement:	FCC Part15 C Section	15.207	100	
Test Method:	ANSI C63.10:2013			
Frequency Range:	150 kHz to 30 MHz	CÍ)		
Receiver setup:	RBW=9 kHz, VBW=30	kHz, Sweep time	e=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 LISN 40cm 80cm Filter AC power EMI Receiver Remark: E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m			
Test Mode:	Transmitting Mode			
Test Procedure:	1. The E.U.T and simulation power through a line (L.I.S.N.). This profimpedance for the m. 2. The peripheral device power through a LIS coupling impedance refer to the block photographs). 3. Both sides of A.C. conducted interference emission, the relative the interface cables ANSI C63.10:2013 of the conducted interface.	e impedance state vides a 500hm easuring equipm es are also connects with 500hm terror diagram of the line are checked to increase of equations of e	pilization network n/50uH coupling ent. ected to the main a 50ohm/50uH mination. (Please test setup and ed for maximum and the maximum sipment and all of ged according to	
Test Result:	N/A; Because the EUT item is not applicable.	is powered by th	e battery, so the	





5.3. Radiated Emission Measurement

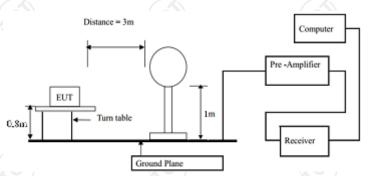
5.3.1. Test Specification

Test Requirement:	FCC Part15	C Section	า 15.209		KQ					
Test Method:	FCC Part15 C Section 15.209 ANSI C63.10:2013									
Frequency Range:	9 kHz to 25 GHz									
. , ,	(C)	<u> </u>	(6))		(6)					
Measurement Distance:	3 m									
Antenna Polarization:	Horizontal 8	& Vertical								
	Frequency Detector		RBW	VBW	Remark					
Receiver Setup:	9kHz- 150kHz 150kHz- 30MHz	Quasi-peak Quasi-peak	200Hz 9kHz	1kHz 30kHz	Quasi-peak Value Quasi-peak Value					
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value					
	Above 1GHz	Peak	1MHz	3MHz	Peak Value					
	Above 1GHz	Peak	1MHz	10Hz	Average Value					
Limit/Eigld strangth of the	Freque	ency	Limit (dBu\	//m @3m)	Remark					
Limit(Field strength of the		-K\	94.		Average Value					
fundamental signal):	2400MHz-24	483.5MHz	114	.00	Peak Value					
	_				_					
	Freque		Limit (dBu\	•	Remark					
	0.009-0		2400/F	` '	Quasi-peak Value					
	0.490-1		24000/		Quasi-peak Value Quasi-peak Value					
	1.705 30MHz-8		40		Quasi-peak Value Quasi-peak Value					
Limit(Spurious Emissions):	88MHz-2		43		Quasi-peak Value Quasi-peak Value					
	216MHz-9	1	46		Quasi-peak Value					
	960MHz		54		Quasi-peak Value					
			54		Average Value					
	Above ²	1GHz	74		Peak Value					
Limit (band edge) :	bands, exceleast 50 dB general rae whichever i	ept for har below the diated em s the lesse	monics, so level of the lission lirer attenua	shall be a he funda nits in s tion.	cified frequency attenuated by at amental or to the Section 15.209,					
Test Procedure:	 whichever is the lesser attenuation. 1. The EUT was placed on the top of a rotating table 0 meters above the ground at a 3 meter chamber below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to formeters above the ground to determine the maximular value of the field strength. Both horizontal arrotations of the antenna are set to make the measurement. 									



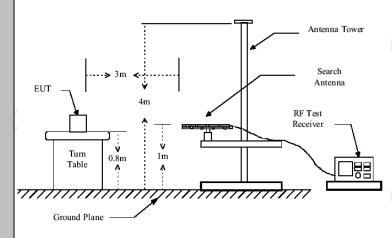
- 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

For radiated emissions below 30MHz



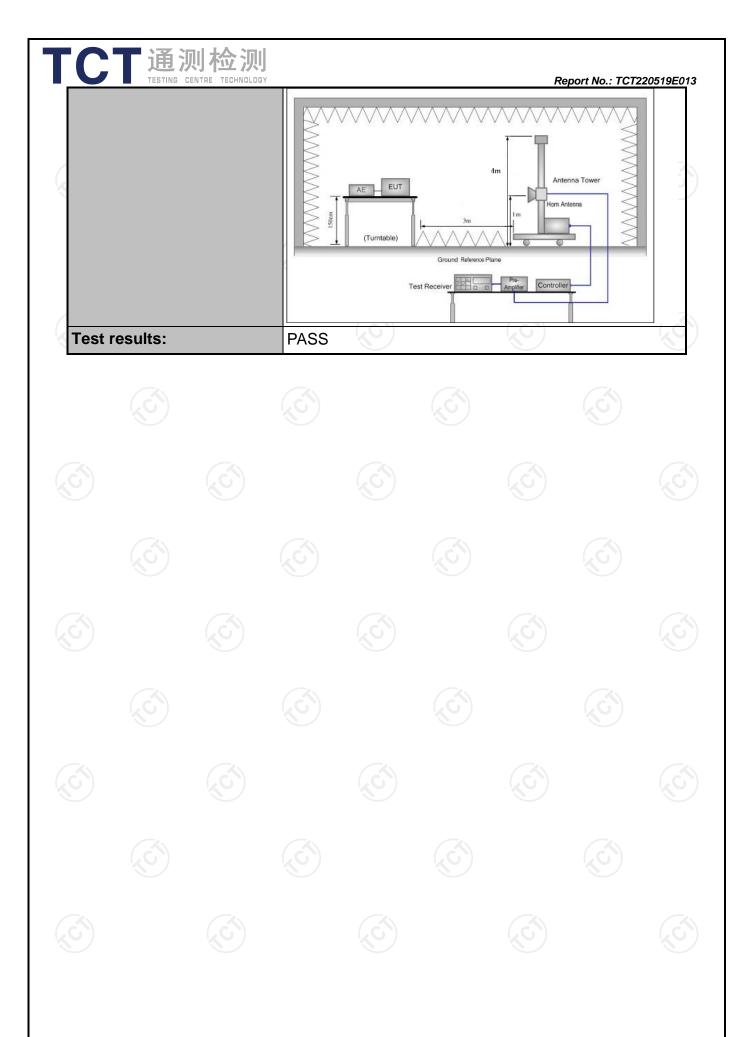
30MHz to 1GHz

Test setup:



Above 1GHz

(The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.)







5.3.2. Test Instruments

	Radiated En	nission Test Site	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jul. 07, 2022
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 07, 2022
Pre-amplifier	SKET	LNPA_0118G- 45	SK2021012 102	Feb. 24, 2023
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Feb. 24, 2023
Pre-amplifier	HP	8447D	2727A05017	Jul. 07, 2022
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Antenna Mast	Keleto	RE-AM	N/A	N/A
Coaxial cable	SKET	RC_DC18G-N	N/A	Feb. 24, 2023
Coaxial cable	SKET	RC-DC18G-N	N/A_	Feb. 24, 2023
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A



5.3.3. Test Data

Field Strength of Fundamental

Frequency (MHz)	Emission PK (dBuV/m)	Horizontal /Vertical	Limits PK (dBuV/m)	Margin (dB)
2405	95.62	Н	114	-18.38
2405	83.48	V	114	-30.52
2430	96.06	н	114	-17.94
2430	84.25	V	114	-29.75
2470	96.18	H	114	-17.82
2470	84.36	V	114	-29.64

Frequency (MHz)	Emission AV (dBuV/m)	Horizontal /Vertical	Limits AV (dBuV/m)	Margin (dB)
2405	93.76	Н	94	-0.24
2405	81.95	V	94	-12.05
2430	93.89	Н	94	-0.11
2430	82.16	V	94	-11.84
2470	93.63	Н	94	-0.37
2470	82.76	V	94	-11.24

Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
	(A)	
(C)	(6)	-120)
		-

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.

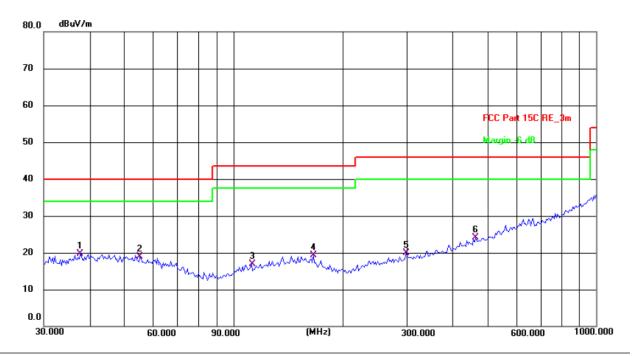
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Frequency Range (30MHz-1GHz)

Report No.: TCT220519E013

Horizontal:



Site #1 3m Anechoic Chamber Polarization: *Horizontal* Temperature: 25(C) Humidity: 55 %

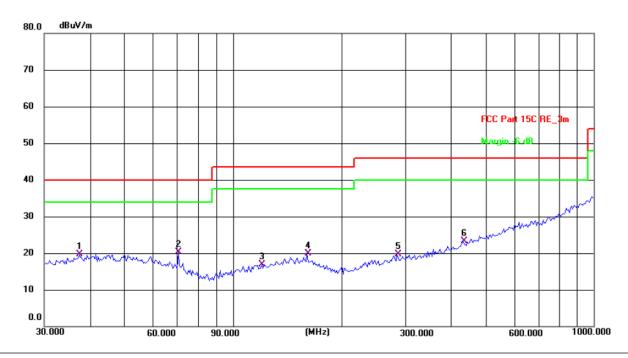
Limit: FCC Part 15C RE_3m Power: DC 3V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	37.8121	6.16	13.50	19.66	40.00	-20.34	QP	Р	
2	55.2207	6.05	12.79	18.84	40.00	-21.16	QP	Р	
3	112.1305	5.95	10.92	16.87	43.50	-26.63	QP	Р	
4	166.0680	6.44	12.79	19.23	43.50	-24.27	QP	Р	
5	299.3158	6.36	13.50	19.86	46.00	-26.14	QP	Р	
6	465.5994	6.48	17.66	24.14	46.00	-21.86	QP	Р	









Site #1 3m Anechoic Chamber Polarization: Vertical Temperature: 25(C) Humidity: 55 %

Limit: FCC Part 15C RE_3m Power: DC 3V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	37.5478	6.32	13.47	19.79	40.00	-20.21	QP	Р	
2 *	70.5835	9.55	10.79	20.34	40.00	-19.66	QP	Р	
3	120.2766	5.25	11.62	16.87	43.50	-26.63	QP	Р	
4	160.3456	6.56	13.35	19.91	43.50	-23.59	QP	Р	
5	284.9767	6.44	13.18	19.62	46.00	-26.38	QP	Р	
6	434.0650	6.36	16.88	23.24	46.00	-22.76	QP	Р	

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (Middle channel) was submitted only.





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Above 1GHz

				ADOVO	10112							
	Low channel: 2405MHz											
requency	Ant Pol	Peak	AV	Correction	Emissio	n Level	Peak limit	AV limit	Margin			
(MHz)	H/V	reading (dBµV)	reading (dBuV)	Factor (dB/m)	Peak (dBµV/m)	AV		(dBµV/m)	(dB)			
4810	Н	49.48		-3.94	45.54		74	54	-8.46			
7215	Н	45.26		0.52	44.78		74	54	-9.22			
4810	V	49.31		-3.94	45.37		74	54	-8.63			

44.11

74

			N	liddle chann	el: 2430M	Hz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	ading reading Factor Peak AV		AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
4860	Н	51.53		-3.98	47.55		74	54	-6.45
7290	Н	46.14		0.57	46.71		74	54	-7.29
	-				/				
	(0)		NO.						
4860	V	50.61		-3.98	46.63)	74	54	-7.37
7290	V	44.92		0.57	45.49		74	54	-8.51
					·				

0.52

	High channel: 2470MHz									
Frequency (MHz)	equency (MHz) Ant. Pol. H/V Peak reading reading reading (dBµV) (dBµV) (dBµV) (dBµV/m) (dBµV/m) (dBµV/m) (dBµV/m)						Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
4940	Н	48.82	-6.6	-3.98	44.84	.c?\-	74	54	-9.16	
7410	Н	44.01		0.57	44.58	<i></i>	74	54	-9.42	
4940	V	50.53		-3.98	46.55		74	54	-7.45	
7410	V	44.79		0.57	45.36		74	54	-8.64	
					J					

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak) (dB\mu V/m)-Average limit (dB\mu V/m)$
- 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.



Report No.: TCT220519E013

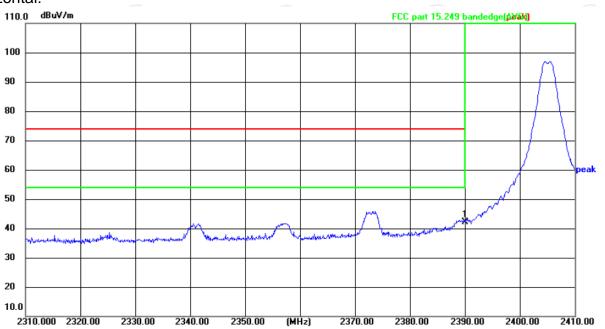
-9.89



Band Edge Requirement

Lowest channel 2405:

Horizontal:



Site Limit: FCC part 15.249 bandedge(peak) Polarization: Horizontal Power:

Temperature: 24(℃)

Humidity: 52 %

	•		• " ,						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2390.000	57.89	-15.76	42.13	74.00	-31.87	peak	Р	











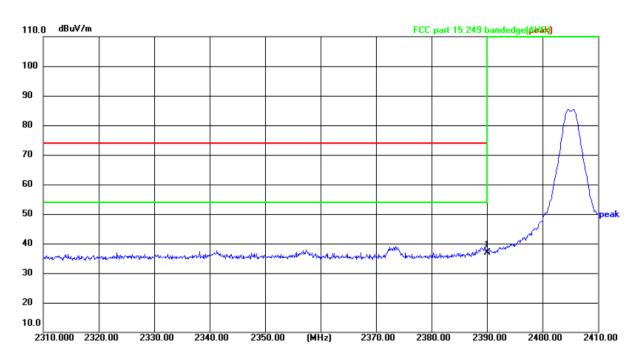








Vertical:



Site Polarization: Vertical Temperature: 24(°C)
Limit: FCC part 15.249 bandedge(peak) Power: Humidity: 52 %

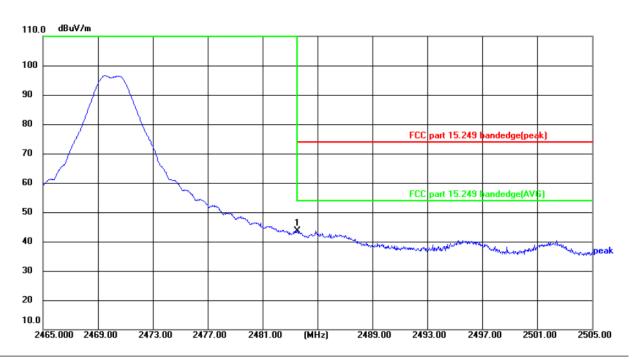
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2390.000	52.75	-15.76	36.99	74.00	-37.01	peak	Р	





Highest channel 2470:

Horizontal:



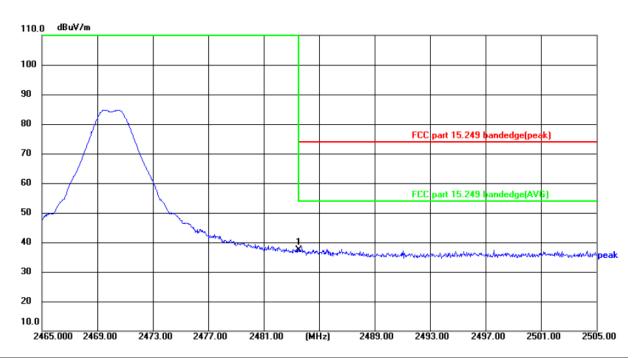
Site Polarization: Horizontal Temperature: 24($^{\circ}$ C) Limit: FCC part 15.249 bandedge(peak) Power: Humidity: 52 $^{\circ}$

No.	Frequency (MHz)			Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	58.96	-15.41	43.55	74.00	-30.45	peak	Р	





Vertical:



Site Polarization: Vertical Temperature: 24(°C)

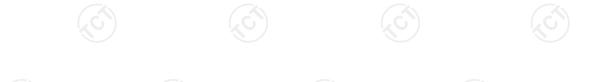
Limit: FCC part 15.249 bandedge(peak) Power: Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	52.87	-15.41	37.46	74.00	-36.54	peak	Р	

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (Middle channel) was submitted only.











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. 18, 2022	



5.4.3. Test data

Report No.: TCT220519E013

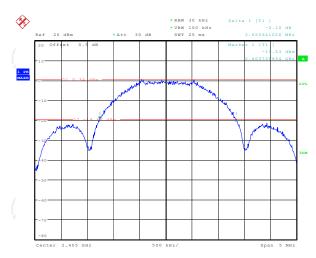
Test Channel	20dB Occupy Bandwidth (kHz)	Limit	Conclusion
Lowest	2620.64	(3)	PASS
Middle	2615.25		PASS
Highest	2555.38		PASS

Test plots as follows:

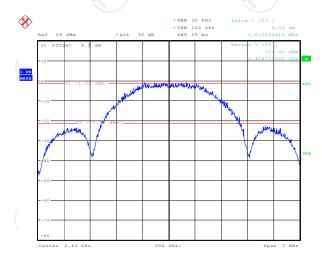




Lowest channel



Middle channel



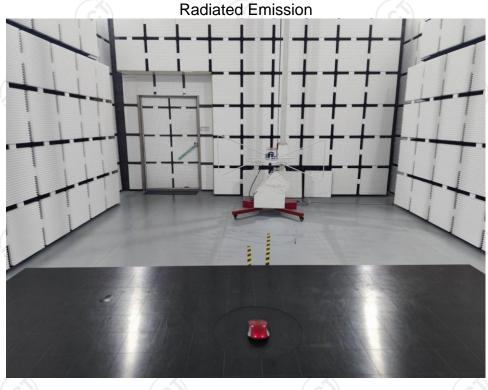
Highest channel

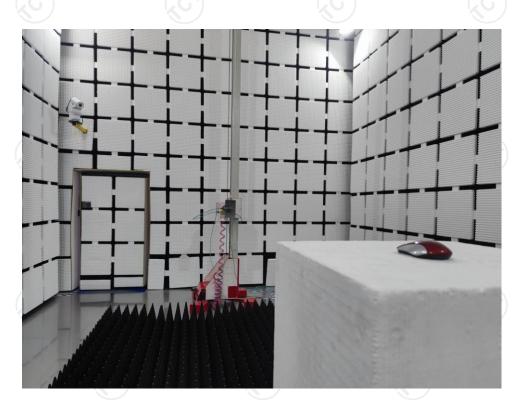




Appendix A: Photographs of Test Setup Product: 2.4G Wireless Mouse

Product: 2.4G Wireless Mouse Model: DM8100







Appendix B: Photographs of EUT

Product: 2.4G Wireless Mouse Model: DM8100 External Photos









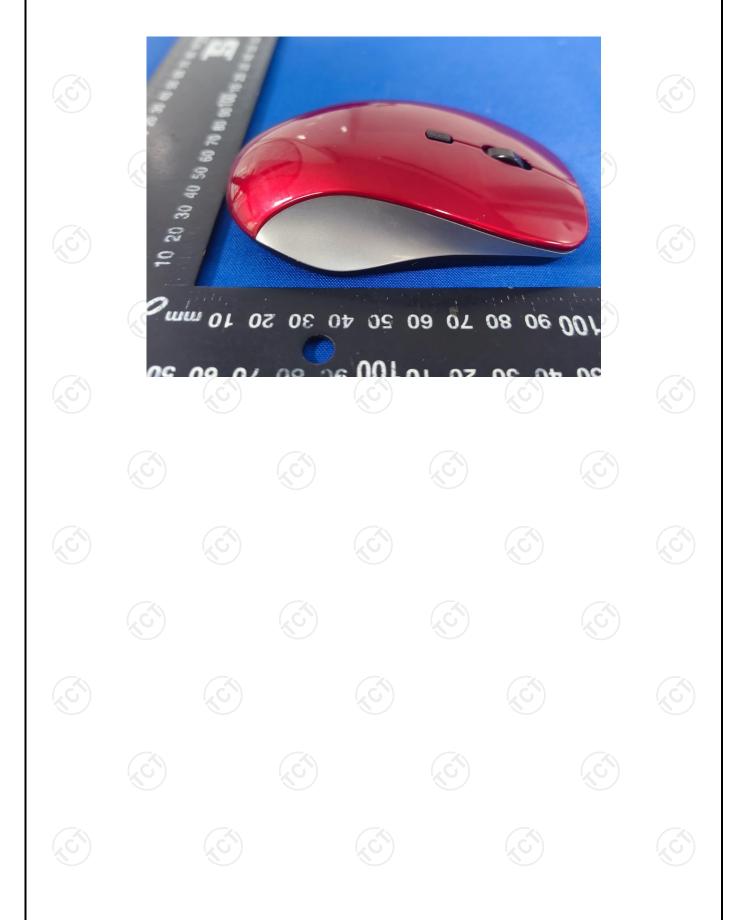


TCT通测检测 TESTING CENTRE TECHNOLOGY











Product: 2.4G Wireless Mouse Model: DM8100 Internal Photos

