

TOGRAN 东莞市铭冠电子科技有限公司
Dongguan Togran Electronics CO.,LTD

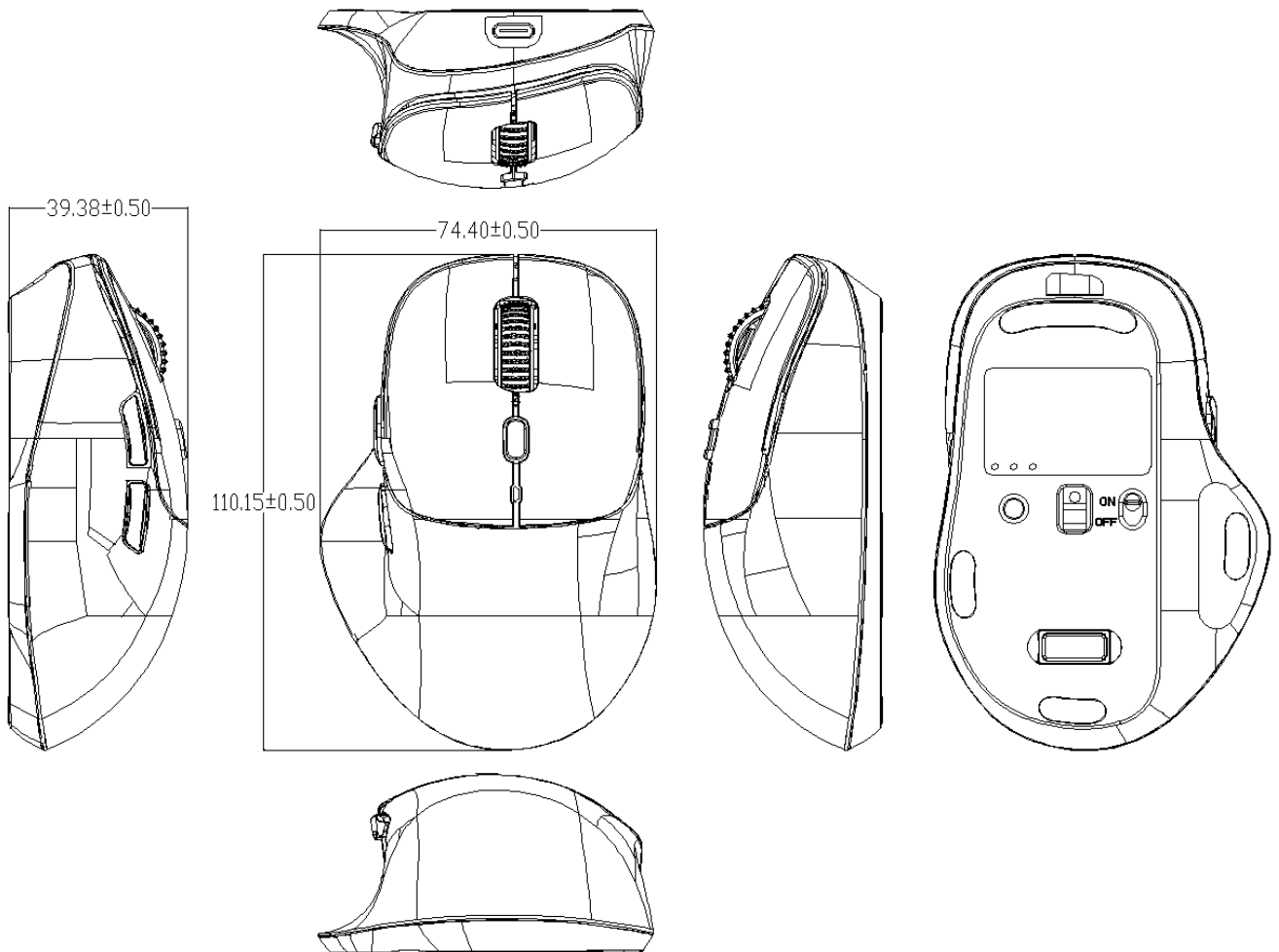
REF.NO. 编号	TG-WR-
REV NO. 版本	A0
PAGE NO. 页码	1/10
INITIATED DATE 制定日期	2025/7/24
REVISED DATE 修定日期	

TITLE 标准书名称	TM291M AI 鼠标规格书
----------------	-----------------

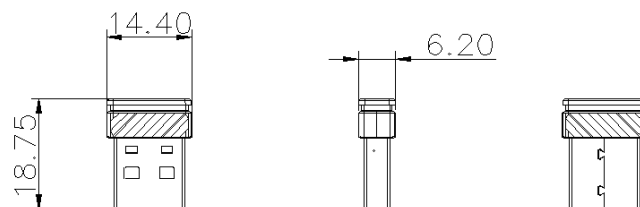
1 介绍 Introduction

本文为 TM291 光学鼠标的功能和性能具体规格

This document contains a functional and performance specification of the Optical TM291 Mouse.

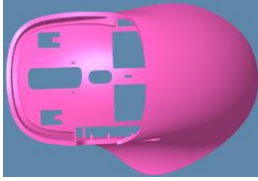
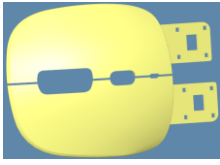
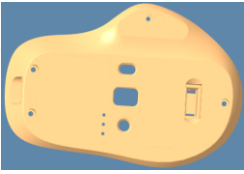

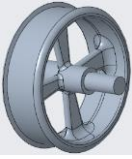
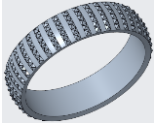

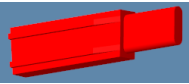



Receiver:


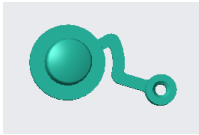


TOGRAN 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	2/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

各零件明细表如下： Mechanical Part

名称 Name	简图 Picture	规格 Spec
上盖 Upper Cover		材质：ABS Material:ABS 颜色：0D Colour: 0D
按键 Key		材质：ABS Material:ABS 颜色：0D Colour: 0D
下盖 Bottom Cover		材质：ABS Material:ABS 颜色：0D Colour: 0D
DPI 按键 DPI Key		材质：ABS Material:ABS 颜色：0D Colour: 0D
滚轮轴 Track Roller		材质：PC Material:PC 颜色：0D Colour: 0D
手轮套 Roller Aprons		材质：硅胶 Material: 颜色：0D Colour: 0D
侧键 Side Key		材质：ABS Material:ABS 颜色：0D Colour: 0D
导光件 Light guide		材质：ABS Material:ABS 颜色：透明 Colour: transparent

 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	3/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

拨动开关 Toggle Switch		材质: ABS Material:ABS 颜色: OD Colour: OD
对码开关 Code Switch		材质: ABS Material:ABS 颜色: OD Colour: OD

2 物理规格 Physical Specification

- 鼠标 MOUSE 尺寸 Dimension:
高 Height: $39.38 \pm 0.5\text{mm}$
长 Length: $110.15 \pm 0.5\text{mm}$
宽 Width: $74.40 \pm 0.5\text{mm}$
- 接收 RECEIVER 尺寸 Dimension:
高 Height: $6.20 \pm 0.50\text{mm}$
长 Length: $18.75 \pm 0.50\text{mm}$
宽 Width: $14.40 \pm 0.5\text{mm}$
- 重量 Weight: 大约 $75.5 \pm 5\text{g}$;
- 功能键: 左键、右键、中键、对码键、电源开关、DPI、侧键、
- Buttons: Left、Right、Middle、Code Button、Power switch、DPI、Side key


3 机械特性 Mechanical Characteristics

- 开关操作压力 Operating force of switches: $40 \sim 60\text{gf}$. (仅开关 Switch Only)
- 鼠标按键操作力量 Mouse switches operating force: $70 \pm 20\text{gf}$
- 滚轮旋转力量 Scroll rotate force: $50 \pm 30\text{gf-cm}$
- 滚轮按键 (中键) 操作力量 Scroll's switch force: $160 \pm 40\text{gf}$
- 侧键操作力量: Side-key force: $90 \pm 20\text{gf}$

4 电气特性 Electrical Characteristics:

接收 Receiver


- 系统介面: PC 可用的 USB 口 System interface: USB port for PC
- 供电电压 Power supply voltage: $4.75 \sim 5.25\text{V}$

 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	4/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	


- 电源消耗 Power consumption: <25mA
- IC: CX51661L
- VID : 25A7 PID : FA61
- USB 描述信息 USB description information: 2.4G Receiver

鼠标 MOUSE

- MCU&SENSOR: BK3632W+PAW3212
- DPI: 800-1200-1600 (default) -2400-3200-**4800**
- 充电电流 Charging Current: 约 180mA。Approximately 180mA.
- 电池 Battery: 300mA 锂电池。300mA lithium battery.
- 充电时间 Charging time: ≤3 hours。
- 工作电流 Working Current: ≤4mA。
- 2.4G 模式 2.4G mode: 工作电流≤4mA(3.7V, 白纸)。待机电流≤0.3mA(停止工作 0s-60s), 休眠电流≤0.05mA(停止工作 60s 后)。Working current ≤ 4mA (3.7V, white paper). Standby current ≤ 0.3mA (stop working for 0s-60s), sleep current ≤ 0.05mA (stop working for 60s).
- 蓝牙模式 Bluetooth mode: BT5.0 Mouse: 工作电流≤4mA(3.7V, 白纸)。待机电流≤0.3mA(停止工作 0-30min), 休眠电流≤0.05mA(停止工作 30min 后)。BT3.0 Mouse: 工作电流≤4mA(3.7V, 白纸)。待机电流≤0.3mA(停止工作 0-30min), 休眠电流≤0.05mA(停止工作 30min 后)。BT5.0 Mouse: Operating current ≤ 4mA (3.7V, white paper). Standby current ≤ 0.3mA (stop working for 0-30min), sleep current ≤ 0.05mA (after stopping working for 30min). BT3.0 Mouse: Operating current ≤ 4mA (3.7V, white paper). Standby current ≤ 0.3mA (stop working for 0-30min), sleep current ≤ 0.05mA (after stopping working for 30min).
- DPI 切换 DPI switching: 轻按鼠标 DPI 键, 鼠标会在 800-1200-1600-2400-3200-4800 这六档 DPI 中循环切换, 当切换到 800 时, 鼠标顶部导光件处会闪烁一次红色然后熄灭, 当切换到 1200 时, 鼠标顶部导光件处会闪烁两次红色然后熄灭, 当切换到 1600 时, 鼠标顶部导光件处会闪烁三次红色然后熄灭, 以此类推。Lightly press the DPI button on the mouse, and the mouse will cycle through the six DPI levels of 800-1200-1600-2400-3200-4800. When switching to 800, the top light guide of the mouse will flash red once and then turn off. When switching to 1200, the top light guide of the mouse will flash red twice and then turn off. When switching to 1600, the top light guide of the mouse will flash red three times and then turn off, and so on.


 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	5/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

- 记忆功能 Memory Function: DPI 有记忆功能。DPI has a memory function.
- 长按 DPI 键 3s 打开 Copilot。Press and hold the DPI key for 3 seconds to open Copilot.
- 模式切换 Mode switching: 鼠标底部电源开关往下拨是关闭电源, 往上拨是给鼠标上电; 当鼠标上电后, 轻按鼠标底部对码键可以在 2.4G (默认) -BT1-BT2 这三种模式中循环切换, 鼠标底部有三个白色指示灯对应三种模式即第一个白色指示灯对应 2.4G 模式, 第二个白色指示灯对应 BT1 模式, 第三个白色指示灯对应 BT2 模式。Turning down the power switch at the bottom of the mouse will turn off the power, while turning up will power on the mouse; When the mouse is powered on, lightly pressing the code button at the bottom of the mouse can cycle between the three modes of 2.4G (default) - BT1-BT2. There are three white indicator lights at the bottom of the mouse corresponding to the three modes: the first white indicator light corresponds to 2.4G mode, the second white indicator light corresponds to BT1 mode, and the third white indicator light corresponds to BT2 mode.
- 低电压指示 Low voltage indication: 当鼠标电源电压 $\leq 3.3V$, 使用时鼠标顶部导光件处会一直闪烁红色, 停止使用后, 慢闪 5 下(大约 5 秒)红色后停止闪烁。When the power supply voltage of the mouse is $\leq 3.3V$, the top light guide of the mouse will flash red continuously during use. After stopping use, the red light will flash slowly for 5 times (about 5 seconds) and then stop flashing.
- 关机电压 Shutdown voltage: 当鼠标电源电压 $\leq 3.0V$, 鼠标会关机。When the power supply voltage of the mouse is $\leq 3.0V$, the mouse will shut down.
- 充电指示 Charge indicator: 当插上 TYPE-C 线材给鼠标充电时, 鼠标滚轮处指示灯会常亮红色, 充满电后, 鼠标滚轮处指示灯会常亮绿色。When the TYPE-C cable is plugged in to charge the mouse, the indicator light at the mouse wheel will be constantly red. After being fully charged, the indicator light at the mouse wheel will be constantly green.
- 2.4G 模式使用方法 2.4G mode usage method: 将鼠标底部电源开关往上拨, 鼠标底部第一个白色指示灯快闪(第一次对码), 进入 2.4G 模式, 插入接收器, 第一个白色指示灯常亮后熄灭即 2.4G 模式可正常使用。Turn up the power switch at the bottom of the mouse, and the first white indicator light at the bottom of the mouse will flash (the first code pairing), entering 2.4G mode. Insert the receiver, and the first white indicator light will remain on and then turn off, indicating that 2.4G mode can be used normally.
- 蓝牙模式使用方法 Usage of Bluetooth mode: 在鼠标电源开关在上面档位时, 轻按鼠标底部对码键将鼠标底部指示灯调到第二个白色指示灯快闪(第一次对码), 进入 BT1 模式, 电脑搜索蓝牙设备 BT5.0 Mouse/BT3.0 Mouse, 选择配对, 第二个白色指示灯常亮后熄灭即 BT1 模式可正常使用; 以此类推, 轻按鼠标底部对码键将鼠标底部指示灯调到第三个白

 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	6/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

色指示灯快闪（第一次对码），进入 BT2 模式，电脑搜索蓝牙设备 BT5.0 Mouse/BT3.0 Mouse，选择配对，第三个白色指示灯常亮后熄灭即 BT2 模式可正常使用。When the power switch of the mouse is in the upper position, lightly press the code matching button at the bottom of the mouse to set the indicator light at the bottom of the mouse to the second white indicator light flashing (the first code matching), enter BT1 mode, search for Bluetooth devices BT5.0 Mouse/BT3.0 Mouse on the computer, select pairing, and the second white indicator light will remain on and then turn off, indicating that BT1 mode can be used normally; Similarly, lightly press the code matching button at the bottom of the mouse to turn the bottom indicator light to the third white indicator light flashing (the first code matching), enter BT2 mode, search for Bluetooth devices BT5.0 Mouse/BT3.0 Mouse on the computer, select pairing, and the third white indicator light will remain on and then turn off, indicating that BT2 mode can be used normally.

- **2.4G 模式强制配对说明 2.4G mode forced pairing instructions:** 将鼠标底部电源开关往上拨，轻按鼠标底部对码键将鼠标底部指示灯调到第一个白色指示灯慢闪（无对码状态下第一个白色指示灯慢闪 3 下后熄灭），同时长按左/中/右三键（3 秒）进入 2.4G 配对状态，鼠标底部第一个白色指示灯以 2HZ/秒快闪 20s 后熄灭（配对时间 20s）；在鼠标底部第一个白色指示灯快闪的 20s 内，插入接收器，第一个白色指示灯常亮 2s 后熄灭，2.4G 配对成功。Turn up the power switch at the bottom of the mouse, lightly press the code matching button at the bottom of the mouse to set the first white indicator light to flash slowly (in the absence of code matching, the first white indicator light will flash slowly for 3 times and then turn off), and long press the left/center/right buttons (3 seconds) to enter the 2.4G pairing state. The first white indicator light at the bottom of the mouse will flash rapidly at 2HZ/s for 20 seconds and then turn off (pairing time of 20 seconds); Within 20 seconds of the first white indicator light flashing at the bottom of the mouse, insert the receiver and the first white indicator light will remain on for 2 seconds before turning off, indicating successful 2.4G pairing.
- **蓝牙模式强制配对说明 Bluetooth mode forced pairing instructions:** 将鼠标底部电源开关往上拨，轻按鼠标底部对码键将鼠标底部指示灯调到第二个或者第三个白色指示灯慢闪（无对码状态下第二个或者第三个白色指示灯慢闪 6 下后熄灭），长按对码键（2-3 秒）进入蓝牙配对状态，鼠标底部第二个或者第三个白色指示灯以 2HZ/秒快闪 2 分钟后熄灭（配对时间 2 分钟）；在鼠标底部第二个或者第三个白色指示灯快闪的 2 分钟内，打开电脑系统-设置-蓝牙，搜索到 BT5.0 Mouse/BT3.0 Mouse，点击进入配对，第二个或者第三个白色指示灯常亮 2s 后熄灭，蓝牙配对成功。Turn up the power switch at the bottom of the mouse,

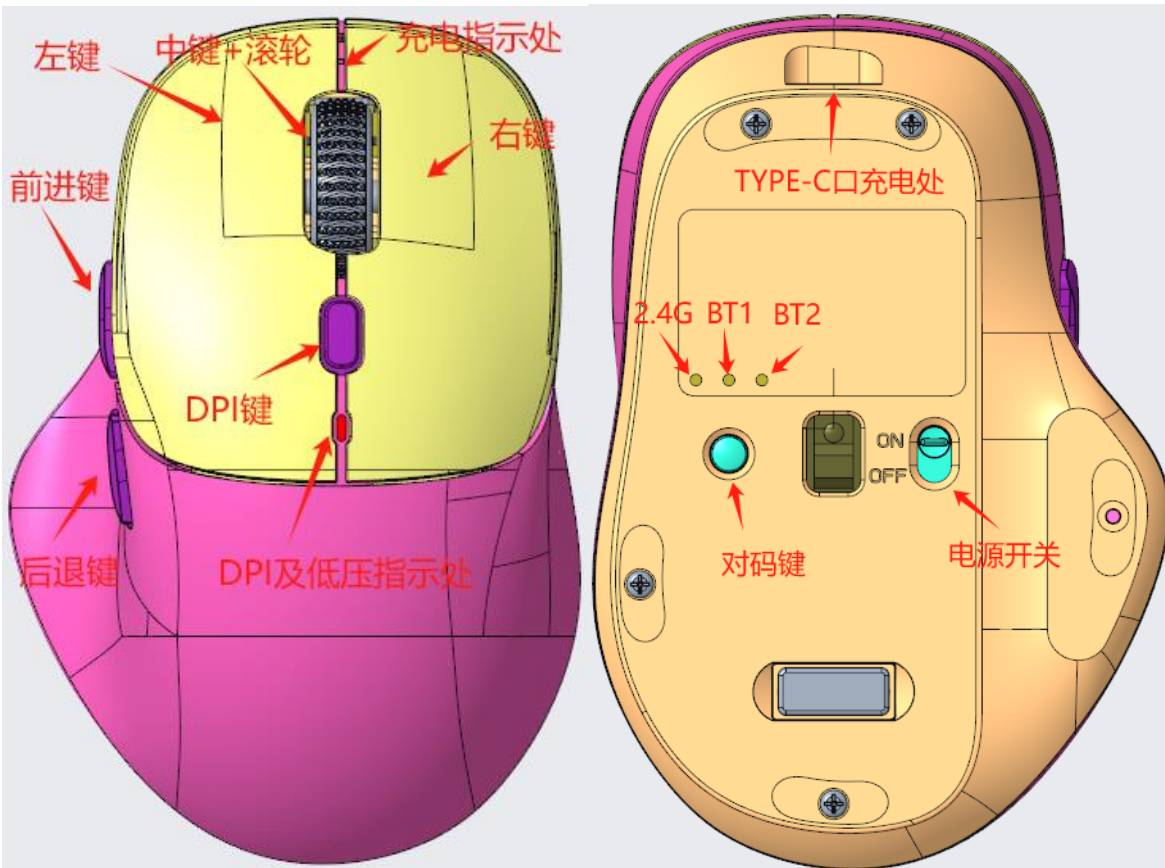
 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	7/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

lightly press the code button at the bottom of the mouse to set the indicator light at the bottom of the mouse to the second or third white indicator light to flash slowly (when there is no code, the second or third white indicator light will flash slowly for 6 times and then turn off), long press the code button (2-3 seconds) to enter Bluetooth pairing mode, and the second or third white indicator light at the bottom of the mouse will flash rapidly at 2HZ/s for 2 minutes and then turn off (pairing time is 2 minutes); Within 2 minutes of the second or third white indicator light flashing at the bottom of the mouse, open the computer system - Settings - Bluetooth, search for BT5.0 Mouse/BT3.0 Mouse, click to enter pairing, and the second or third white indicator light will remain on for 2 seconds before turning off, indicating successful Bluetooth pairing.

5 移动性能 move Spec

- 解析度 Resolution: 800-1200-1600 (default) -2400-3200-4800DPI (X 和 Y 方向)
- 最大的速度 Tracking Speed: 30 ips
- 最大的加速度 Acceleration: 10G
- 回报率 Report Rate: 2.4G: 250Hz/BT: 115Hz
- 使用距离 Use Distance: 2.4G 模式: 10M(无遮挡, 空旷), 蓝牙模式: 10M(无遮挡, 空旷)。
2.4G mode: 10M (unobstructed, open), Bluetooth mode: 10M (unobstructed, open).

TOGRAN 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	8/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	



6 环境定义 Environment

6.1 温度 Temperature

使用温度范围 Operating Temperature : 0°C to 40°C;

使用湿度范围 Operating Humidity: ≤85%;

6.2 环境实验 Environmental Test

6.2.1 高温试验 High Temperature Test

温度 Temperature: 65±2°C;

时间 Time: 96 小时;


湿度 Humidity: 90% R.H.

6.2.2 低温试验 Low Temperature Test

温度 Temperature: -20±2°C;

时间 Time: 96 小时 ;

6.2.3 高温高湿测试 Moisture Test

 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	9/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

温度 Temperature: $40\pm 2^{\circ}\text{C}$;

湿度 Humidity: 90~95% R.H.;

测试时间 Time: 96 hours;

6.2.4 高低温测试 high-low temperature test

温度 Temperature: $-40\pm 2^{\circ}\text{C}$ for 0.5 hour and then $70\pm 2^{\circ}\text{C}$ for 0.5 hour;

进行次数 Cycles: 12 cycles;

上述测试鼠标样品通过这个实验后要在室温下静置一个小时 The test mouse sample was left to sit at room temperature for an hour after passing the test.

7 可靠性参数 Reliability Specifications

7.1 鼠标寿命测试 Mouse Life Test

负载 load: 100gf 垂直方向压力 Vertical force;

速度 Speed: 200 ± 40 mm/sec;

行程 Travel: 最小 300 km 各向 Any direction;

7.2 开关寿命测试 Switch Life Test

速度 Speed: 5 cycles/sec;

操作力度 (左、右键) Operating Force of left&Right button: 60gf Max;

寿命次数 Operating Cycles: Left&Right 3,000,000 cycles

Scroll wheel button\Forward\Back 3,000,000 cycles

7.3 滚轮寿命测试 Scroll Wheel Life Test

转动速度 Operating Speed: 1 cycle/sec;

操作力量 Operating Force: 50 ± 30 gf-cm;

操作次数 Operating Cycles: 300,000 cycles;

7.4 裸摔测试 Drop Test

次数 Number: 1 times;

高度 Height: 78 cm;

方向 Direction: 6 surface each one times;

表面 Floor surface: wood floor

可靠性测试的判定: 因为各项测试均为破坏性测试, 每项测试均需独立取样。每项测试

 东莞市铭冠电子科技有限公司 Dongguan Togran Electronics CO.,LTD		REF.NO. 编号	TG-WR-
		REV NO. 版本	A0
		PAGE NO. 页码	10/10
TITLE 标准书名称	TM291M AI 鼠标规格书	INITIATED DATE 制定日期	2025/7/24
		REVISED DATE 修定日期	

后的样品可正常工作即判定通过该项测试。Determination of reliability test: since each test is destructive, each test must be independently sampled. The sample after each test can work normally namely judge to pass this test.

7.5 ESD: 空气放电 Air Discharge $\pm 8KV$ 接触放电 Contact Discharge $\pm 4KV$
7.6 EFT: $\pm 1KV$

8 如需规格书内未定义之规格，则依照正式提出需求的规格为准

Note: Should there be any specifications not defined in the specificasheet, the formally proposed specifications shall prevail.

9 认证 Certificates

- FCC CLASS B PART15
- CE

要求符合铭冠以下三大文件：The following three documents are required

a. 《键盘类外观检验标准 T-WQ-007/鼠标类外观检验标准 TG-WQ-008/耳机类外观检验标准

TG-WQ-005》

《Keyboard Appearance inspection standard T-WQ-007/Mouse Appearance

inspection standard TG-WQ-008/Earphone Appearance inspection standard TG-WQ-005》

b. 《键盘&鼠标可靠性试验管理规范 TG-WQ-004/耳机可靠性试验管理规范 TG-WQ-006》

《Keyboard&Mouse Reliability test management specification TG-WQ-004/Earphone

Reliability test management specification TG-WQ-006》

c. 《TG-HSF-300 环保要求》

《Environmental Specification TG-HSF-300》