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# Product Specification for Telink 825x Dual-Mode Mouse

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**Keyword:**

BLE Mode; 2.4GHz Mode; Features; Specifications

**Brief:**

This document is the product specification for Telink TLSR825x-based BLE/2.4GHz dual-mode mouse. It mainly introduces key features and specifications in 2.4GHz mode and BLE mode.



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## Revision History

Version	Major Changes	Date	Author
1.0.0	Initial release	2019/5	YKQ, Cynthia

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## 1 Key Features

Telink 825x dual-mode mouse, wireless BLE/2.4GHz mouse solution based on the TLSR825x chip, supports flexible switch between BLE (Bluetooth Low Energy) mode and common 2.4GHz mode.

### 1.1 Frequency channel

The dual-mode mouse works in worldwide 2.4GHz ISM band 2400~2480 MHz.

- ◇ In 2.4GHz mode, eight frequency channels are supported, as shown in Table 1.

Table 1 Frequency points (Unit: MHz)

2,405	2,413
2,422	2,430
2,440	2,450
2,460	2,470

- ◇ In BLE mode, standard 40 channels are supported.

### 1.2 Channel bandwidth

- ◇ In 2.4GHz mode, channel bandwidth is 2MHz.
- ◇ In BLE mode, channel bandwidth is 1MHz.

### 1.3 System compatibility

- ◇ In 2.4GHz mode, the dual-mode mouse supports operating systems as follows:  
WinXP/Win7/Win8/Win 10/Linux/Mac OS.
- ◇ In BLE mode, the dual-mode mouse can only be used in OS with BLE mouse support, e.g. Win7/Win8/Win10/iOS10/Andriod5.0 (or above) device.

### 1.4 RF Tx power

Without external RF (Radio Frequency) PA (Power Amplifier), RF Tx power for the dual-mode mouse can reach maximum value of +8dBm.

## 2 Basic Specifications

### 2.1 Operating voltage

Depending on adopted hardware circuit, the dual-mode mouse supports dual batteries (3V) and single battery (1.5V) for power supply.

### 2.2 Communication distance

The dual-mode mouse supports communication distance up to 25 meters in 2.4GHz mode and 18 meters in BLE mode.

### 2.3 Compatible sensors

The dual-mode mouse is compatible with the following types of sensors:

- ◇ SENSOR\_3204
- ◇ SENSOR\_3204LL
- ◇ SENSOR\_3204UL
- ◇ SENSOR\_3205
- ◇ SENSOR\_AN3205
- ◇ SENSOR\_SIGMA\_8630
- ◇ SENSOR\_PAW3207
- ◇ SENSOR\_VT108
- ◇ SENSOR\_M8589
- ◇ SENSOR\_KA9
- ◇ SENSOR\_PAW3212
- ◇ SENSOR\_OM16
- ◇ SENSOR\_YS8006
- ◇ SENSOR\_YS8008
- ◇ SENSOR\_FCT3065-XY, FCT3065XY-D

**\*Note:** Compatible sensors may vary depending on Firmware version. Customer must check the Firmware version to get the final sensor support information, and carry out small-scale production verification before mass production.

## 2.4 Button function

The dual-mode mouse supports seven buttons, including left button, right button, middle button, forward button, back button, DPI selection button and mode switch button.

## 2.5 Mode switch

The dual-mode mouse enters 2.4GHz mode by default. User can click the mode switch button to flexibly switch between 2.4GHz mode and BLE mode.

After each mode switch operation, the mouse will automatically save current mode in its flash. Meanwhile, the LED indicating lights of the mouse will blink correspondingly to indicate its current mode.

- ✧ If the red LED blinks once, it indicates the mouse has entered 2.4GHz mode.
- ✧ If the green LED blinks twice, it indicates the mouse has entered BLE mode.

## 2.6 Pairing method

Wireless mouse must be successfully paired with a dongle before it's ready for use.

In BLE mode, the mouse will enter pairing mode by pressing the mode switch button and holding it for 3s. In pairing mode, its LED light starts blinking. After successful pairing, the LED light will be turned off and the mouse enters connection state. If the mouse is not successfully paired within the allowed duration (1min by default), pairing fails due to timeout, and the mouse enters sleep state.

In 2.4GHz mode, depending on user's requirement, the mouse supports two pairing modes including pairing-free mode and manual pairing mode.

- 1. Pairing-free mode:** In this mode, any mouse and any dongle can be combined into a pair. For dongle, pairing is only allowed within 1 minute after power on. Recombination of mouse and dongle is supported after power cycle.



**2. Manual pairing mode:** The two cases below are supported as per the time when it's allowed to initiate manual pairing.

- ✧ Only allowed to initiate manual pairing when power on: When power on, press the middle button and the right button of the mouse and hold them for 1s~2s. Then release both the buttons to enter pairing mode.
- ✧ Allowed to initiate manual pairing at any time: As long as the mouse is not paired successfully, user can freely press the middle button and the right button for 1s~2s and then release them to enter pairing mode.

## 2.7 DPI switch

For most compatible sensor types, DPI value is switchable among three rates.

On every short click of the DPI selection button, the DPI value changes to the next available value in the list. For each rate switch, the green LED light will blink with the frequency of 2Hz, and the number of blinking times equals the rate number, i.e. when the DPI value changes to Rate1/Rate2/Rate3, the LED indicating light will blink once/twice/three times with the frequency of 2Hz.

Table 2 DPI value switch

Rate1	Rate2 (Default)	Rate3
800	1200	1600

**\*Note:** For the 3212 sensor, DPI value supports four rates and the DPI value of Rate4 is 2400.

## 2.8 Low-voltage alarm function

The dual-mode mouse supports the function of low battery voltage alarm, and the alarm threshold is pre-set as 2.2V/1.1V correspondingly for dual-battery/single-battery power supply. The threshold is customizable as needed.

No matter whether the mouse is working or static, as long as the battery voltage drops below the threshold, the LED light will blink three times with the frequency of 4Hz to indicate the low-voltage status.

## 2.9 Report rate

In BLE mode, the mouse's report rate is fixed as 133, i.e. 133 data will be reported to PC per second.

In 2.4GHz mode, the mouse's report rate is fixed as 125, i.e. 125 data will be reported to PC per second.

## 2.10 EMI test mode

In 2.4GHz mode, the mouse can enter EMI mode to implement frequency point and frequency offset test.

In 2.4GHz mode, press the left, middle and right buttons of the mouse for 1 second at the same time. Then release all the buttons to enter EMI test mode.

After entering EMI test mode, both test mode and frequency point are switchable. The dual-mode mouse supports three test modes and three test channels.

1) Press the middle button to switch mode:

Carry --> Carry + Data (CD mode in brief) --> RX --> TX -> Carry-->...;

2) Press the left/right button to switch frequency point:

Left button: (2405MHz -->2430MHz --> 2470MHz) loop;

Right button: (2405MHz --> 2470MHz -->2430MHz) loop.

## 2.11 OTA function

In BLE mode, the dual-mode mouse supports OTA (Over-The-Air) function, i.e. user can upgrade mouse firmware via specific OTA operations.

## 2.12 Encryption

In BLE mode, AES encryption of Bluetooth standard protocol is supported.

In 2.4GHz mode, AES128 encryption is supported. During normal usage, all of the mouse's data will be encrypted using AES128, and user can burn private secret key during production, so as to avoid data eavesdropping and monitoring by any attacker.

## 3 Power Saving Mode and Working Current

### 3.1 Power saving mode

In 2.4GHz mode, the dual-mode mouse supports three-level power saving modes, as shown below:

Table 3 Power saving mode and wakeup method in 2.4GHz mode

Power-saving mode	Entering method	Wakeup method
Power-saving 1	Stop moving the mouse, and release all the buttons.	Move the mouse, press button or slide the wheel
Power-saving 2	Keep the mouse static for several seconds.	Move the mouse, press button or slide the wheel
Deep sleep	The mouse will enter deep sleep mode after 10 minutes of no action.	Move the mouse, press button or slide the wheel

### 3.2 Working current

**\*Test condition:** Pixart 3212 sensor, 1.5V DC-DC 2.2V power

Table 4 Typical working current

Mode	Fast move sensor (mA)	Press button (mA)	Slide wheel (mA)	suspend1 (mA)	suspend2 (mA)	Deepsleep (uA)
BLE mode	5.1~5.5	2.6~3.3	2.6~3.7	0.15~0.37	0.11~0.33	15~30
2.4GHz mode	4.1	2.9~3.1	2.8~3.1	0.3	0.27	20~33

**\*Note:** Current consumption is related to hardware factors such as sensor type, power supply, and lens.