
OM31

**USB
MCU+Sensor 2-in-1
Optical Mouse IC**

Product Specification

Doc. VERSION 1.0

ELAN MICROELECTRONICS CORP.

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1 General Description

The OM31 IC is integrated with a USB Micro-controller Unit (MCU) for computer optical mouse utilization. It is housed in a unique 14 pins staggered dual in-line DIP like package for 3D3K application. The chip has the resolutions of 800/1000/1200 dots per inch (DPI) and catches the surfaces images at 3200 times per second. Its tracking speed is up to 20 inches per second (IPS).

2 Features

- Optical sensor and USB MCU are integrated into a single chip
- Comply with USB version 1.1 protocol
- Up to 20 IPS high speed motion detection
- Frame rate is up to 3200 frames per second
- 5 volt power supply
- Built-in 3.3V and 1.8V voltage regulators
- 14-pin staggered DIP
- The resolutions are *800/*1000/*1200 dpi.
- Supports 3D3K and Z/2 mouse scrolling
- Three operating modes, Active, Standby, and Power Down modes
- Automatic Standby mode (takes effect after no motion elapses for more than 1 second)
- Enters power down mode when USB device goes to suspend mode
- *Conform with Green Products protocol

NOTE

The part number is OM31CPS for 800 dpi

The part number is OM31DPS for 1000 dpi

The part number is OM31EPS for 1200 dpi

These are all Green Products which do not contain hazardous substances

3 Pin Configuration (Package)

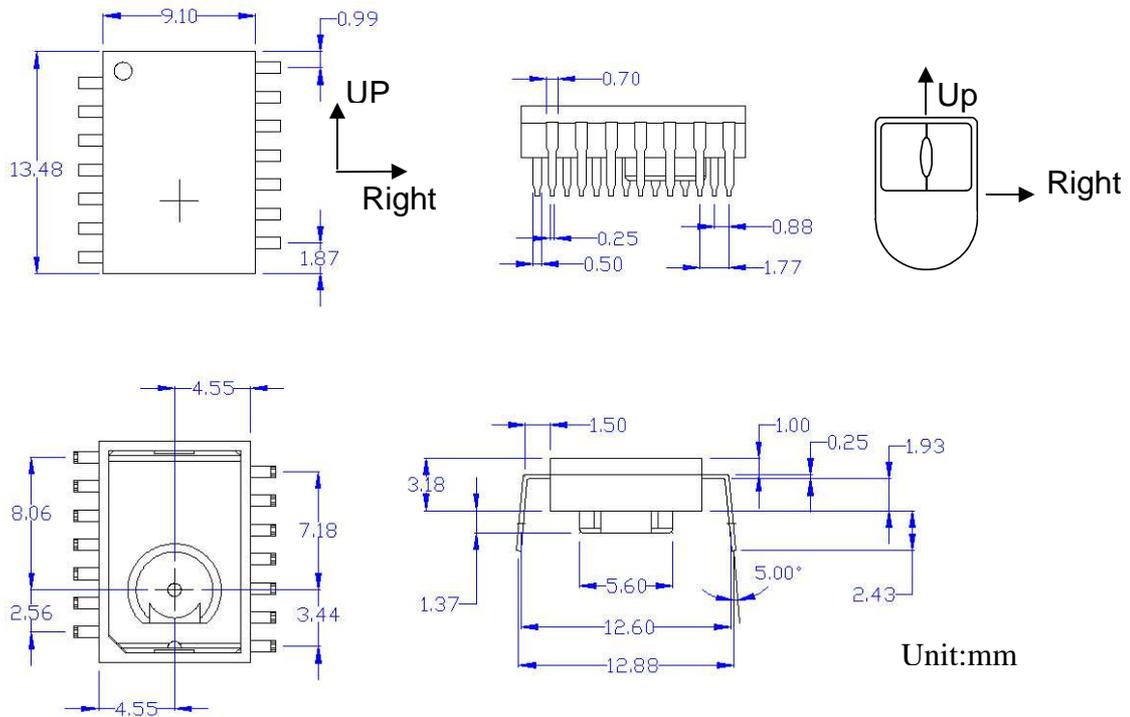


Figure 3-1 OM31 outline

4 Functional Block Diagram

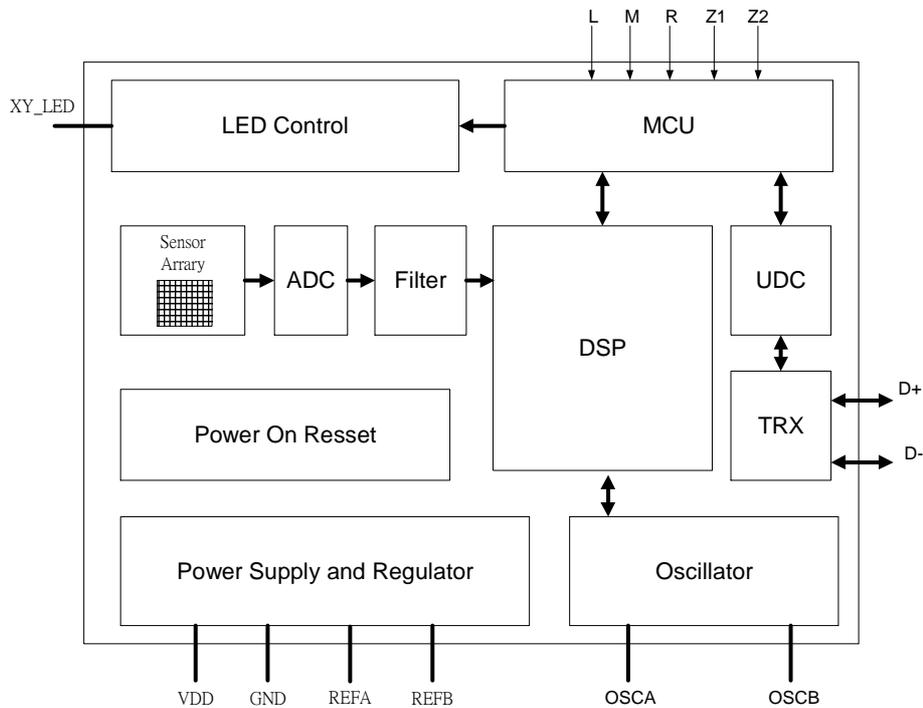
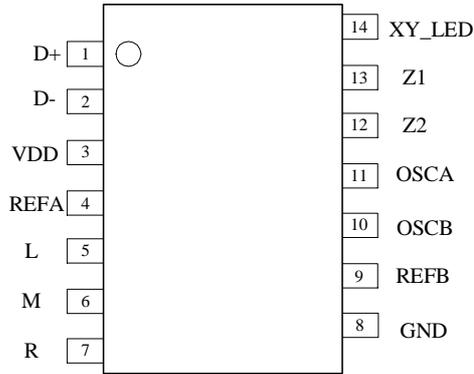


Figure 4-1 OM31 Functional Block Diagram

5 Pin Descriptions



Pin No.	Symbol	I/O	Description
1	D+	I/O	USB D+
2	D-	I/O	USB D-
3	VDD	-	5 V DC power supply
4	REFA	-	3.3V Reference
5	L	I	Left key
6	M	I	Middle key
7	R	I	Right key
8	GND	-	Ground
9	REFB	-	1.8V Reference
10	OSCB	-	Oscillator
11	OSCA	-	
12	Z2	I	Scroller
13	Z1	I	
14	XY_LED	O	LED control

6 Absolute Maximum Rating

Parameter	Symbol	Min.	Max	Unit	Notes
Storage Temperature Range	Tstr	-40	85	°C	-
Operating Temperature Range	Totr	-15	40	°C	-
Lead Solder Temperature	-	-	245	°C	For 10 seconds, 1.6mm below seating plane.
Supply Voltage	VDD	-0.5	5.5	V	-
Input Voltage	Vin	-0.5	5.5	V	Pin1, Pin2, Pin14
		-0.5	3.6	V	All GPIO pins except Pin1, Pin2, Pin14
ESD	ESD	-	2	KV	All pins, human body model
Distance from Lens Reference Plane to Surface Plane	D	2.2	2.4	mm	This distance actually depends on the lens. 2.2 to 2.4 mm is just the most popular design range. Verify and confirm with your lens supplier for the best distance.

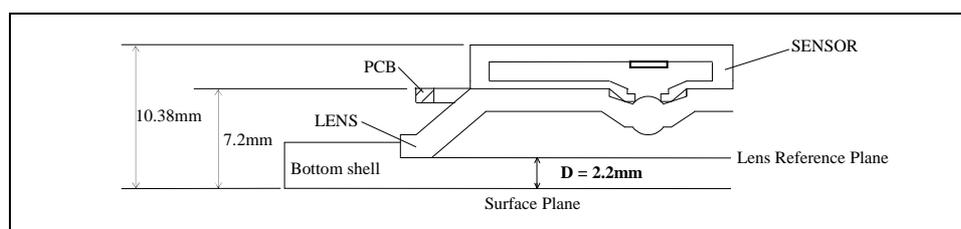


Figure 6-1 Distance from Lens Reference Plane to Surface Plane

7 DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Supply Voltage	VDD	4.0	5.0	5.5	V	
DC Reference A	VrefA	3.0	3.3	3.6	V	
DC Reference B	VrefB	1.6	1.8	2.0	V	
Input Low Voltage	V _{IL}	-	-	0.8	V	
Input High Voltage	V _{IH}	2.0	-	-	V	
Output Low Voltage	V _{OL}	-	0	0.5	V	
Output High Voltage	V _{OH}	2.8	3.3	3.6	V	
Output Low Current	I _{OL}		10		mA	
Output High Current	I _{OH}	-	-10	-	mA	
Resolution	Res	-	800	1200	DPI	
Speed	S	-	20	-	in/sec	At 800 dpi
Clock Frequency	FCLK	-	24	-	MHz	
Resonator	Res	-	6	-	MHz	
Sensor Frame Rate	f _{frame}	-	3000	3200	frames/sec	
LED Current (Average)	I _{LED}	2.0	-	17	mA	P_Bin LED R_LED=51Ω
DC Supply Current	Mouse Active	IDDACT	-	5.5	mA	No load on GPIO. Excluding LED current.
	Standby	IDDSTB	-	3	mA	
	Power Down	IDDPD	-	340	uA	

8 Application Circuit

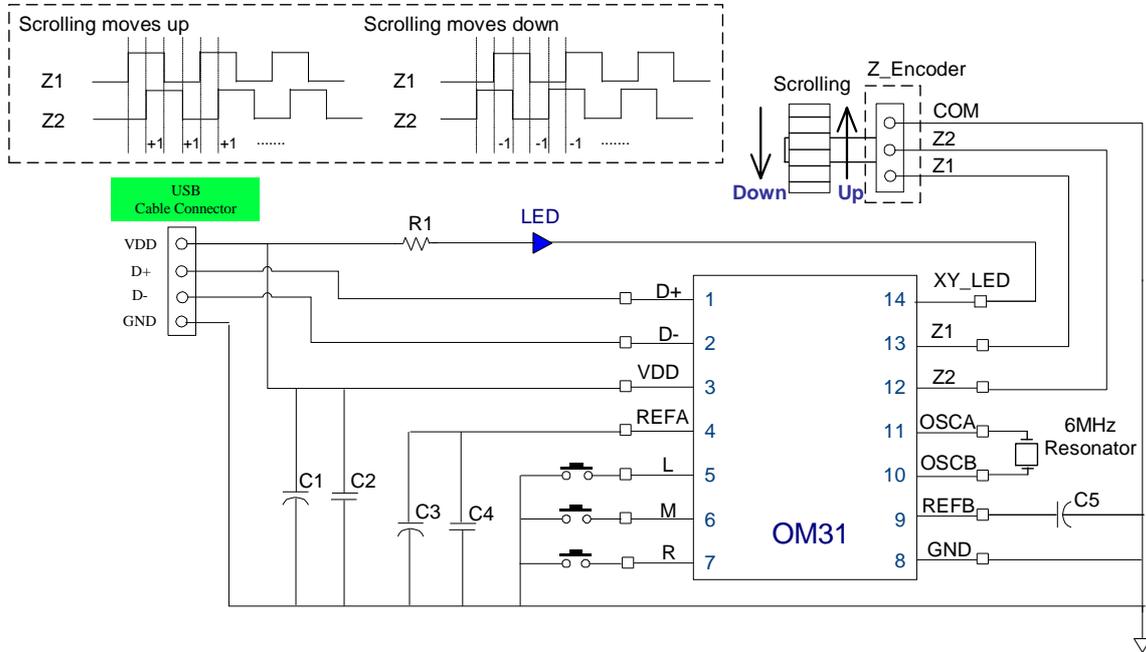


Figure 8-1 MODE-I for Basic Circuit

Where: **R1**: 33 ~51 Ohm, **C1**: 10uF, **C2**: 0.1uF, **C3**: 10uF, **C4**: 0.1uF, **C5**: 4.7uF

NOTE

1. For the P bin LED (3600- 4700mcd), the LED maximum average current (when working on black surfaces) of LED is about 17mA and the LED minimum average current (when working on white surfaces) is 2mA with R1=51 Ohm.
2. If the LED illumination is less than P bin, then R1=33 Ohm is recommended. It will allow the LED maximum average current to reach 25mA.
3. The cable connector is better located at the left side of the sensor to shorten the track length of D+ and D-.
4. C1, C2, C3, C4, C5 and 6MHz Resonator must be as close to sensor as possible.
5. A Large and complete ground is better than several small and separated grounds.

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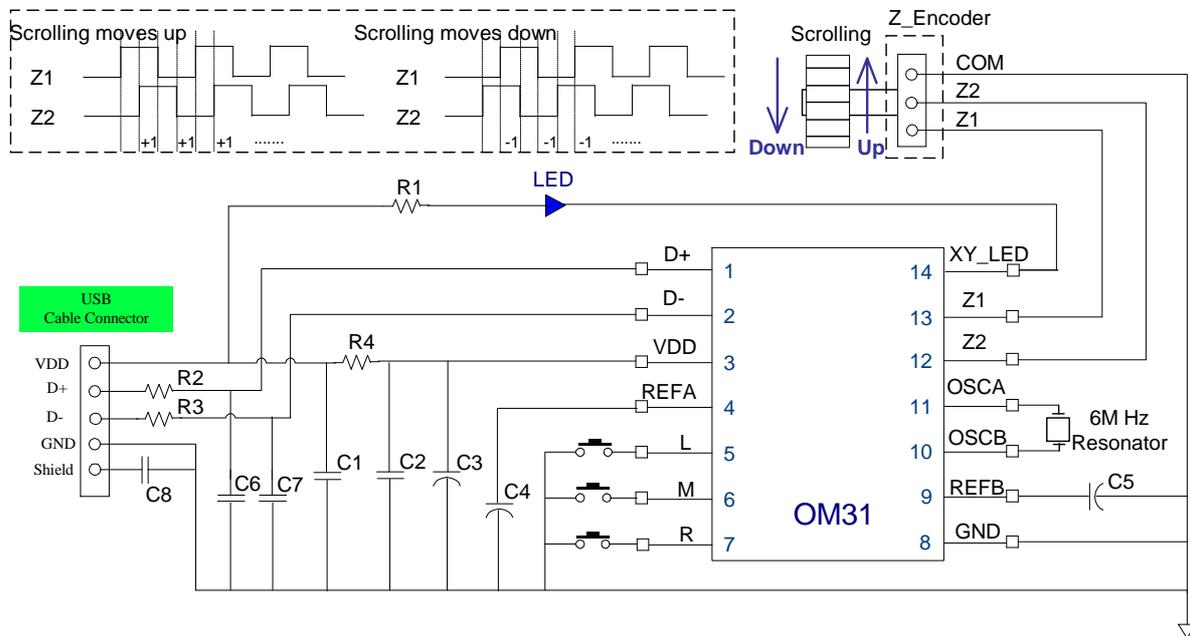


Figure 8-2 MODE-I I for Better EMC performance.

Where: **R1:** 33 ~51 Ohm, **R2:** 33 Ohm, **R3:** 33 Ohm, **R4:** 10 Ohm,
C1: 0.1uF, **C2:** 0.1uF, **C3:** 10uF, **C4:** 10uF, **C5:** 4.7uF, **C6:** 150pF, **C7:** 150pF, **C8:** 10nF(103),

NOTE

1. For the P bin LED (3600- 4700mcd), the LED maximum average current (when working on black surfaces) of LED is about 17mA and the LED minimum average current (when working on white surfaces) is 2mA with R1=51 Ohm.
2. If the LED illumination is less than P bin, then R1=33 Ohm is recommended. It will allow the LED maximum average current to reach 25mA.
3. The cable connector is better located at the left side of the sensor to shorten the track lengths of D+ and D-.
4. R2, R3, R4, C1, C2, C6, C7 and C8 must be as close to the cable connector as possible.
5. R2 should be placed near C6 to form a R-C low pass filter to reduce EMI noises and the same with R3 and C7.
6. R4 should be placed between C1 and C2, besides, C1, C2 and R4 must be very close to each other to form a π -type filter to reduce EFT noises.
7. C3, C4, C5 and 6MHz Resonator must be as close to the sensor as possible.
8. A Large and complete ground is better than several small and separated grounds. If necessary, add 0 ohm resistor jumps on the quiet I/O pins (L, M, R, Z1, and Z2) to make the ground as large (or completed) as possible.
9. Must choose the cable which is with the shield.

9 PCB Through-Holes (Vias) Layout

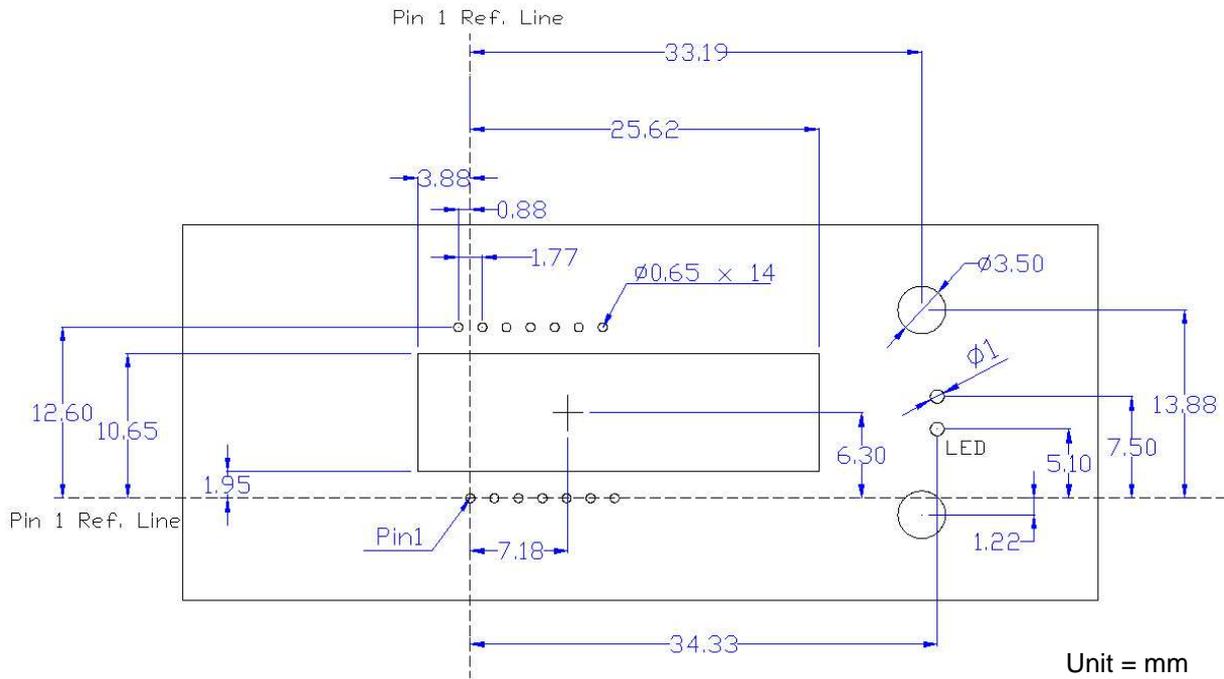


Figure 9-1 PCB Vias Layout for OM31

10 Package Type

MCU+Sensor 2-in-1 Optical Mouse IC	Package Type	Pin Count	DPI
OM31CPS	OMD14	14 pins	800
OM31DPS	OMD14	14 pins	1000
OM31EPS	OMD14	14 pins	1200

Where: **“xP”** stands for “OMD14” DPI Info. and package type
“S” stands for compliance with Sony SS-00259 standard