

## 3-Key 3D USB+PS/2 Optical Mouse Controller

### Features

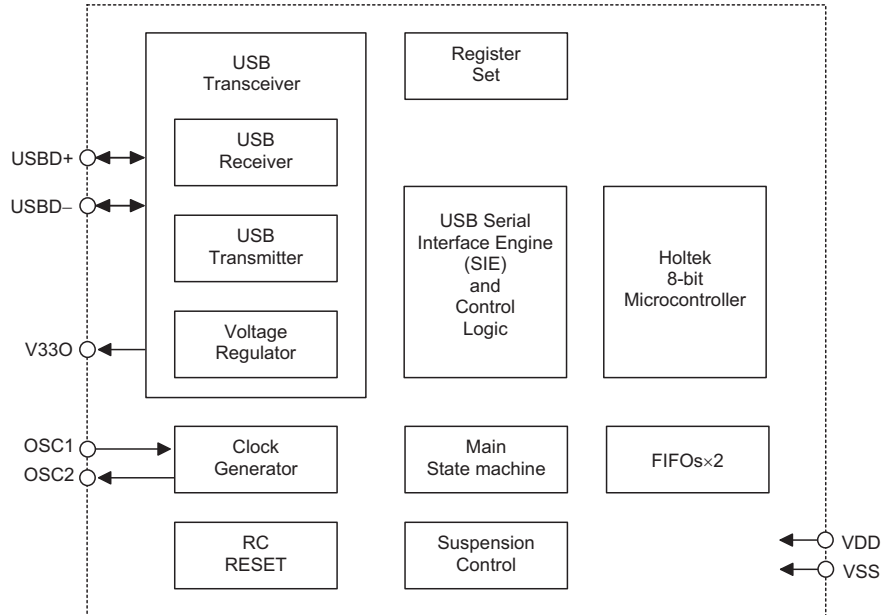
- Operating voltage: 4.4V~5.25V
- Complete Universal Serial Bus specs V1.1 compatibility
- Serial Bus Interface Engine (SIE)
- USB transceiver
- Microsoft 3D Intelli mouse and IBM PS/2 mouse compatible
- Supports three buttons (R, M, L) and Z-axis input
- Z-axis can support two kinds of scroller input (optomechanical and mechanical)
- Single chip solution especially for USB mouse function
- HALT function and wake-up feature reduce power consumption
- Plug and Play functions
- Minimal external components
- 6MHz crystal oscillator for system clock
- Interface compliant with ADNS-2051, ADNS-2610 and ADNS-2620
- Pass WHQL, USB-IF and EMC testing
- 18-pin DIP package

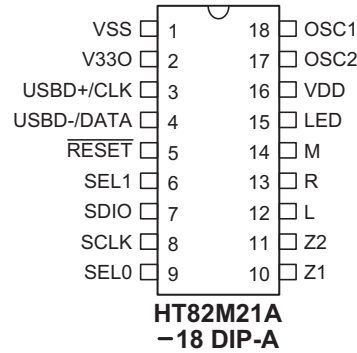
### General Description

HT82M21A is a 3D mouse controller especially designed for USB and PS/2 applications. The HT82M21A can support the USB Standard Request as well as HID Class Request version 1.1. It is compatible with Microsoft Intelli 3D PS/2 mouse. The Z-axis can support two kinds of scroller input, namely; optomechanical and

mechanical. It requires minimal external components to implement 3D USB plus PS/2 optical mouse. It can be briefly described as a Holtek 8-bit MCU with an on-chip USB interface logic. The USB is specified by the *Universal Serial Bus Specification V1.1*.

### Block Diagram



**Pin Assignment**

**Pin Description**

Pin No.	Pin Name	I/O	Description
1	VSS	—	Negative power supply, ground
2	V33O	O	3.3V voltage output
3	USB+/CLK	I/O	USB data plus or PS2 Clock, F/W auto-detect USB+ for USB, CLK for PS2
4	USB-/DATA	I/O	USB data minus or PS2 Data, F/W auto-detect USB- for USB, DATA for PS2
5	RESET	I	Chip reset input, low active
6 9	SEL1 SEL0	I	Configuration selections SEL1=0: Z-axis is divided by 2 (default) SEL1=1: Z-axis is divided by 4 For ADNS 2051: SEL0=0: 800DPI (default) SEL0=1: 400DPI For ADNS 2610/2620: SEL0=0, 400DPI (default) SEL0=1, 800DPI-by firmware
7	SDIO	I/O	Serial data for Agilent sensor IC SDIO
8	SCLK	I	Serial data for Agilent sensor IC SCLK
10, 11	Z1, Z2	I	Z-axis input supports two kinds of scroller input; optomechanical and mechanical.
12, 13, 14	L, R, M	I	Input ports with pull-high resistor. These pads can function as Left, Right, Middle.
15	LED	I/O	Drives LED output
16	VDD	—	5V positive power supply
17	OSC2	O	6MHz OSC output
18	OSC1	I	6MHz OSC input

**Absolute Maximum Ratings**

Supply Voltage .....	$V_{SS}-0.3V$ to $V_{SS}+6V$	Storage Temperature .....	$-50^{\circ}C$ to $125^{\circ}C$
MCU Input Voltage .....	$V_{SS}-0.3V$ to $V_{DD}+0.3V$	Operating Temperature .....	$-25^{\circ}C$ to $70^{\circ}C$
USB Input Voltage .....	$V_{SS}-0.3V$ to $V_{33O}+0.3V$		

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

**D.C. Characteristics**

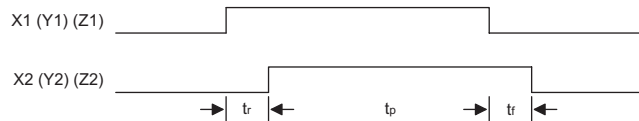
Ta=25°C

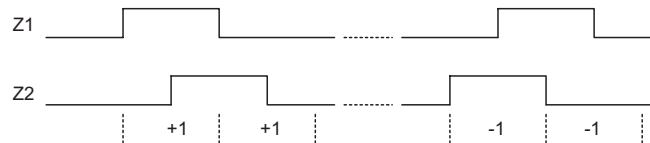
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit	
		V <sub>DD</sub>	Conditions					
V <sub>DD</sub>	Operating Voltage	—	—	4.4	—	5.25	V	
I <sub>DD</sub>	Operating Current (Crystal OSC)	5V	No load, f <sub>sys</sub> =6MHz	USB mode	—	10	—	mA
				PS/2 mode	—	3	—	mA
I <sub>STB</sub>	Standby Current	5V	No load, system HALT	—	—	250	μA	
V <sub>IL1</sub>	Input Low Voltage for I/O Ports	5V	—	0	—	1.0	V	
V <sub>IH1</sub>	Input High Voltage for MCU I/O Ports	5V	—	3.5	—	5	V	
V <sub>IL2</sub>	Input Low Voltage ( $\overline{\text{RESET}}$ )	5V	—	0	—	1.5	V	
V <sub>IH2</sub>	Input High Voltage ( $\overline{\text{RESET}}$ )	5V	—	3.5	—	5	V	
V <sub>IH3</sub>	Input High Voltage for USB I/O Ports	3.3V	—	2.8	—	3.6	V	
V <sub>POR</sub>	Power on Reset V <sub>DD</sub> Detection Voltage	5V	—	3.5	—	3.9	V	
I <sub>OL1</sub>	Output Port Sink Current	5V	V <sub>OL</sub> =0.5V	—	4	—	mA	
I <sub>OH1</sub>	Output Port Source Current	5V	V <sub>OL</sub> =4.5V	—	-4	—	mA	
I <sub>OL2</sub>	Output Port Sink Current (LED)	5V	V <sub>OL</sub> =4.5V	—	50	—	mA	

**A.C. Characteristics**

Ta=25°C

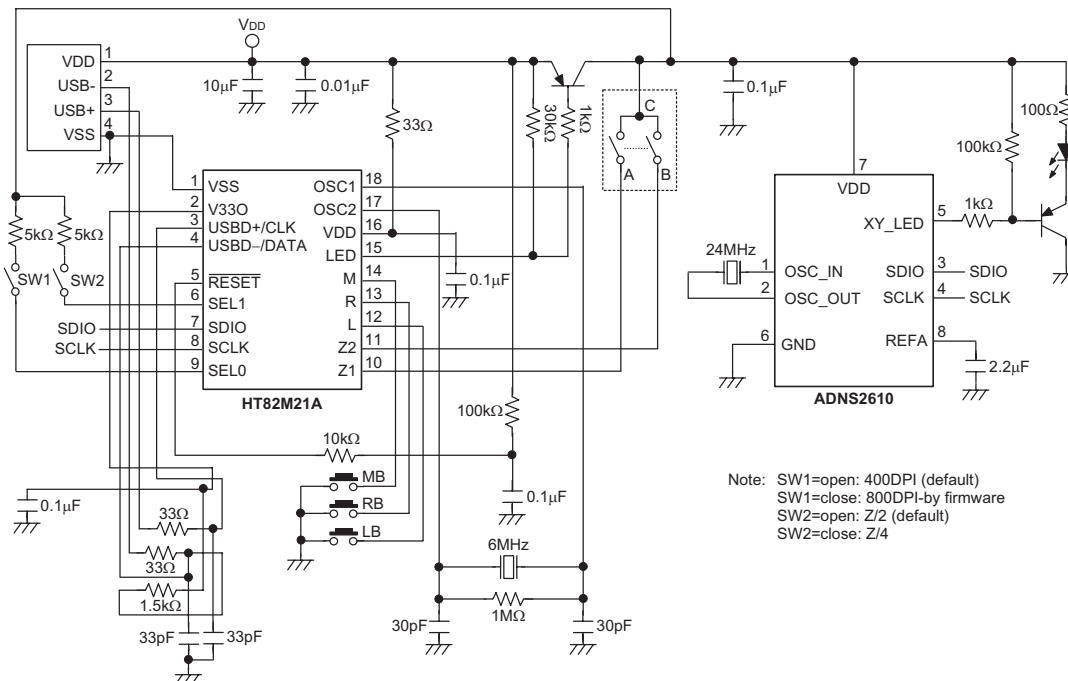
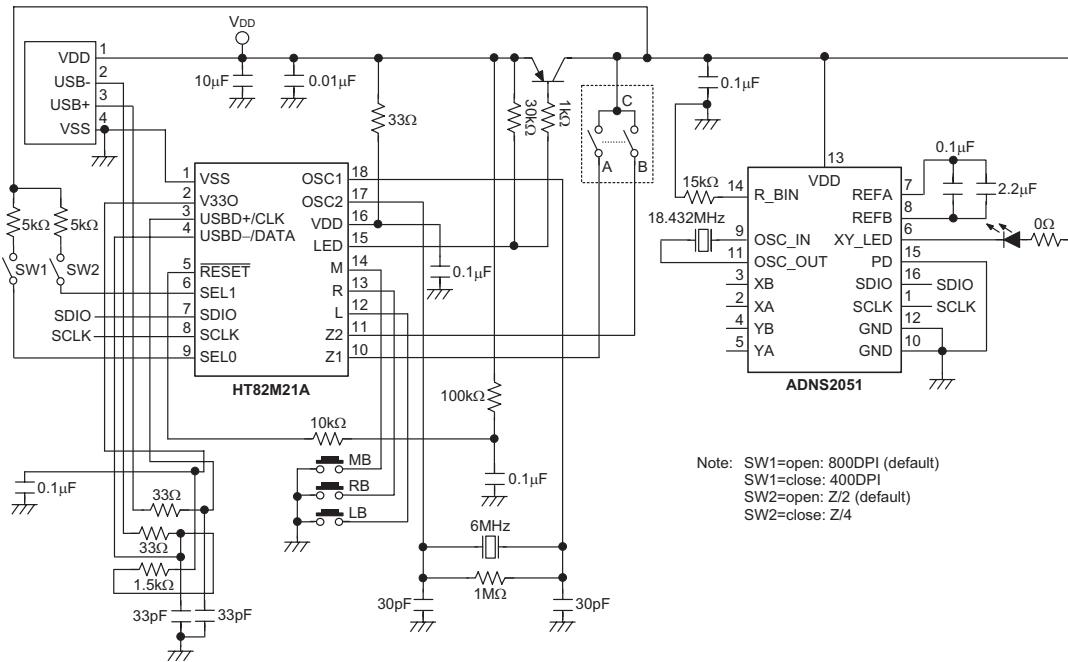
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>DD</sub>	Conditions				
f <sub>sys</sub>	System Clock (Crystal OSC)	5V	—	0	6000	—	kHz
t <sub>OST</sub>	Oscillation Start-up Timer Period	—	Power-up or wake-up from HALT	—	1024	—	t <sub>sys</sub>

 Note: t<sub>sys</sub>=1/f<sub>sys</sub>
**Timing Diagram**
**Z-axis Photo-Coupler Crossed Width**

 Note: For X, Y-axis tr, tp, tf > 30μs  
 For Z-axis tr, tp, tf > 2.5ms

**Z-axis Counting**


Application Circuits

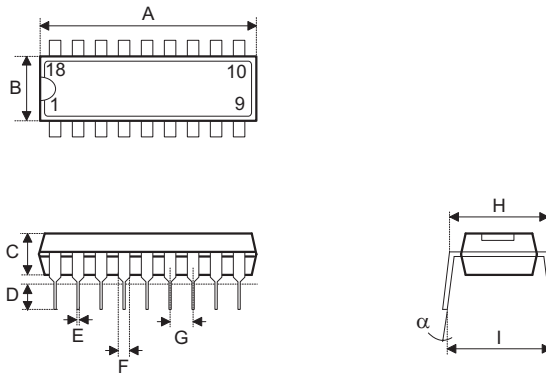
This Application Circuit is for Reference Only



Note: Layout 0.1μF capacitor, 33Ω resistor and 0.01μF capacitor as close to VDD pin as possible.

**Package Information**

**18-pin DIP (300mil) Outline Dimensions**



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	895	—	915
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
$\alpha$	0°	—	15°

**Holtek Semiconductor Inc. (Headquarters)**

No.3, Creation Rd. II, Science Park, Hsinchu, Taiwan  
Tel: 886-3-563-1999  
Fax: 886-3-563-1189  
<http://www.holtek.com.tw>

**Holtek Semiconductor Inc. (Taipei Sales Office)**

4F-2, No. 3-2, YuanQu St., Nankang Software Park, Taipei 115, Taiwan  
Tel: 886-2-2655-7070  
Fax: 886-2-2655-7373  
Fax: 886-2-2655-7383 (International sales hotline)

**Holtek Semiconductor Inc. (Shanghai Sales Office)**

7th Floor, Building 2, No.889, Yi Shan Rd., Shanghai, China 200233  
Tel: 021-6485-5560  
Fax: 021-6485-0313  
<http://www.holtek.com.cn>

**Holtek Semiconductor Inc. (Shenzhen Sales Office)**

5/F, Unit A, Productivity Building, Cross of Science M 3rd Road and Gaoxin M 2nd Road, Science Park, Nanshan District, Shenzhen, China 518057  
Tel: 0755-8616-9908, 8616-9308  
Fax: 0755-8616-9533

**Holtek Semiconductor Inc. (Beijing Sales Office)**

Suite 1721, Jinyu Tower, A129 West Xuan Wu Men Street, Xicheng District, Beijing, China 100031  
Tel: 010-6641-0030, 6641-7751, 6641-7752  
Fax: 010-6641-0125

**Holtek Semiconductor Inc. (Chengdu Sales Office)**

709, Building 3, Champagne Plaza, No.97 Dongda Street, Chengdu, Sichuan, China 610016  
Tel: 028-6653-6590  
Fax: 028-6653-6591

**Holmate Semiconductor, Inc. (North America Sales Office)**

46729 Fremont Blvd., Fremont, CA 94538  
Tel: 510-252-9880  
Fax: 510-252-9885  
<http://www.holmate.com>

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