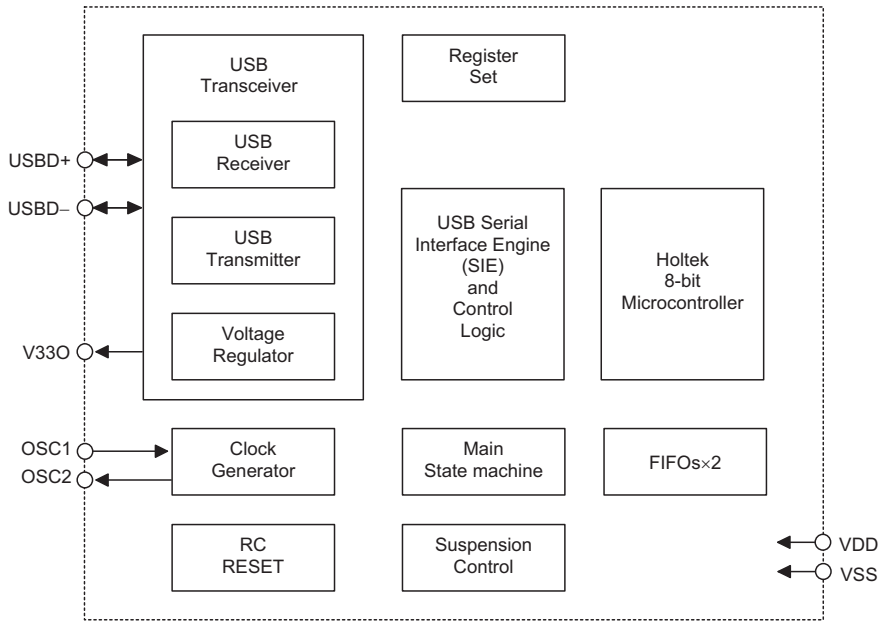
Features

- 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 three axes (X, Y, Z) input
- Z axis can only support encoder which divided by 2
- 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
- 18/20-pin DIP package

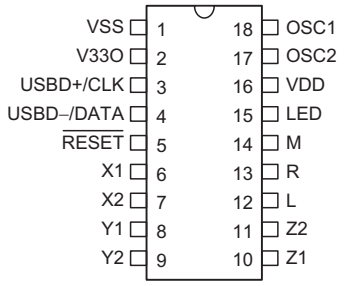
General Description

HT82M98A is a 3D mouse controller especially designed for USB and PS/2 applications. The HT82M98A 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 X/Y axis photo input with built-in Holtek's special dynamic photo-input resistor and 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 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.*

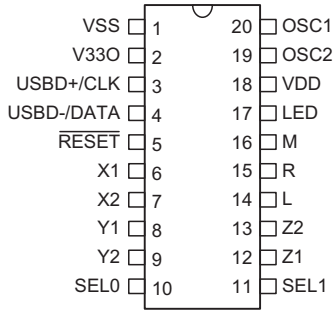
Block Diagram



Pin Assignment



HT82M98A
18 DIP-A



HT82M98A
20 DIP-A

Pin Description

Pin Name	I/O	Description
USB Interface (2 pins)		
USBD+/CLK	I/O	USB data plus or PS2 Clock, F/W auto-detect USBD+ for USB, CLK for PS2
USBD–/DATA	I/O	USB data minus or PS2 Data, F/W auto-detect USBD– for USB, DATA for PS2
General purpose I/O (11 pins)		
X1, X2	I	X-axis photo input with built-in Holtek's special dynamic photo input resistor
Y1, Y2	I	Y-axis photo input with built-in Holtek's special dynamic photo input resistor
Z1, Z2	I	Z-axis input supports two kinds of scroller input; optomechanical and mechanical
L, R, M	I	Input ports with pull-high resistor. These pads can function as Left, Right and Middle button input lines.
SEL0* SEL1*	I I	SEL0=1: 400DPI (default) SEL0=0: 800DIP SEL1=1: USB and PS2 combo (default) SEL1=0: USB only
Miscellaneous (7 pins)		
VSS	—	Negative power supply, ground
V33O	O	3.3V voltage output
RESET	I	Chip reset input, low active
LED	I/O	Drives LED output
VDD	—	5V positive power supply
OSC2	O	6MHz OSC output
OSC1	I	6MHz OSC input

Note: "*" These functions are only available on date code '-4' version

Absolute Maximum Ratings

Supply Voltage ..... V_{SS}–0.3V to V_{SS}+6V

MCU Input Voltage..... V_{SS}–0.3V to V_{DD}+0.3V

USB Input Voltage ..... V_{SS}–0.3V to V_{33O}+0.3V

Storage Temperature ..... –50°C to 125°C

Operating Temperature ..... –25°C to 70°C

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_{DD}	Conditions					
V_{DD}	Operating Voltage	—	—		4.4	—	5.25	V
I_{DD}	Operating Current (Crystal OSC)	5V	No load, f_{SYS}=6MHz	USB mode	—	10	—	mA
				PS/2 mode	—	3	—	mA
I_{STB}	Standby Current	5V	No load, system HALT		—	—	250	μA
V_{IL1}	Input Low Voltage for I/O Ports	5V	—		0	—	1.0	V
V_{IH1}	Input High Voltage for MCU I/O Ports	5V	—		3.5	—	5	V
V_{IL2}	Input Low Voltage ($\overline{RESET}$)	5V	—		0	—	1.5	V
V_{IH2}	Input High Voltage ($\overline{RESET}$)	5V	—		3.5	—	5	V
V_{IH3}	Input High Voltage for USB I/O Ports	3.3V	—		2.8	—	3.6	V
V_{POR}	Power on Reset V_{DD} Detection Voltage	5V	—		3.5	—	3.9	V
I_{OL1}	Output Port Sink Current	5V	V_{OL}=0.5V		—	4	—	mA
I_{OH1}	Output Port Source Current	5V	V_{OL}=4.5V		—	–4	—	mA
I_{OL2}	Output Port Sink Current (LED)	5V	V_{OL}=4.5V		—	50	—	mA
R_{PH}	Pull-high Resistance for $\overline{RESET}$	5V	—		50	100	150	kΩ

A.C. Characteristics

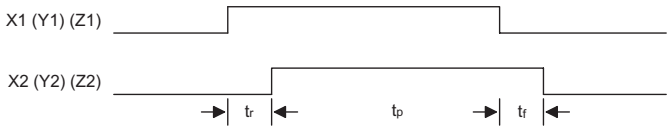
Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
f_{SYS}	System Clock (Crystal OSC)	5V	—	0	6000	—	kHz
t_{OST}	Oscillation Start-up Timer Period	—	Power-up or wake-up form HALT	—	1024	—	t_{SYS}

Note: $t_{SYS}=1/f_{SYS}$

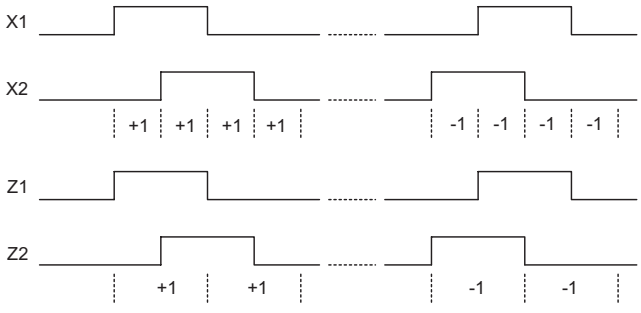
Timing Diagram

X, Y Axis Photo-Coupler Crossed Width



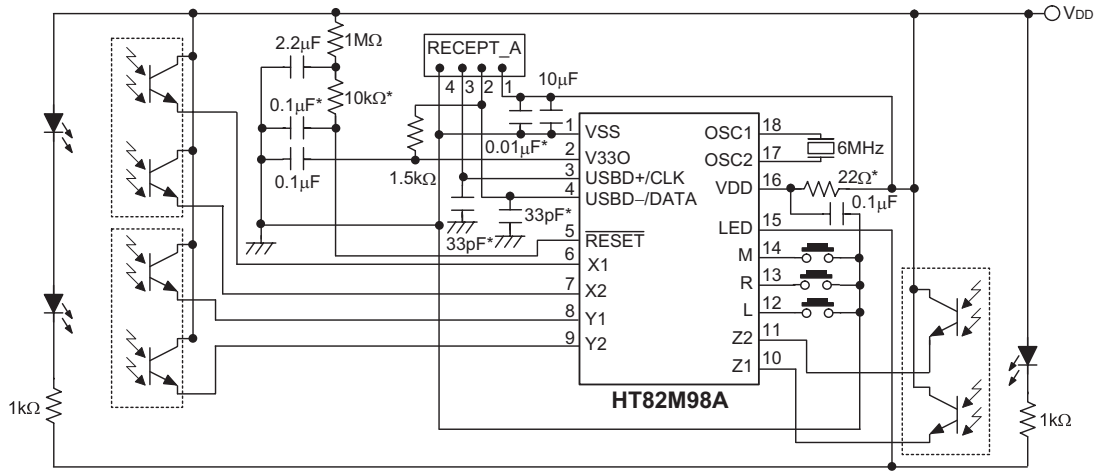
Note: For X, Y-axis t_r, t_p, t_f > 30μs
For Z-axis t_r, t_p, t_f > 2.5ms

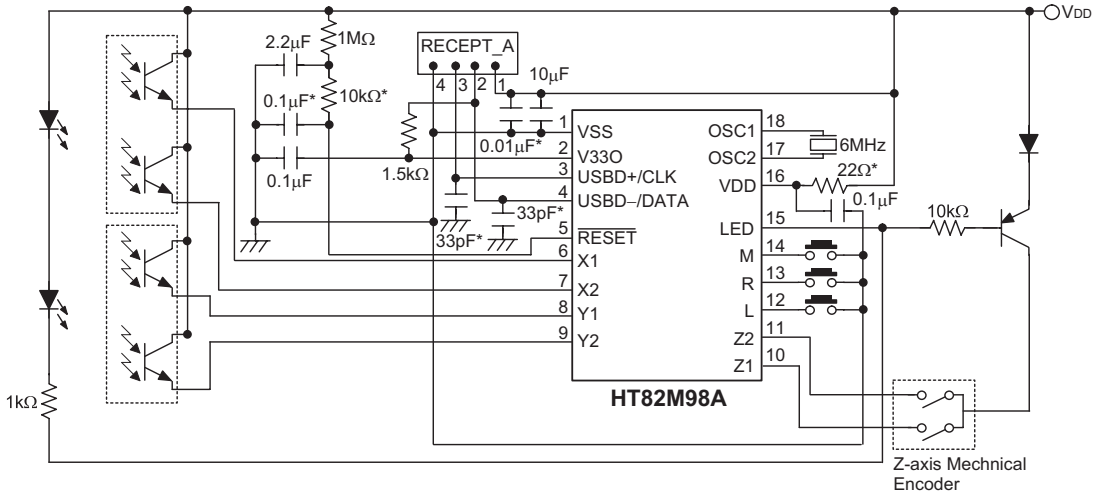
X, Y, Z Axis Counting



Application Circuits

This Application Circuit is for Reference Only





Note: Layout 0.1μF capacitor, 22Ω resistor and 0.01μF capacitor as close to VDD pin as possible.

Layout power plane and ground plane as large as possible.

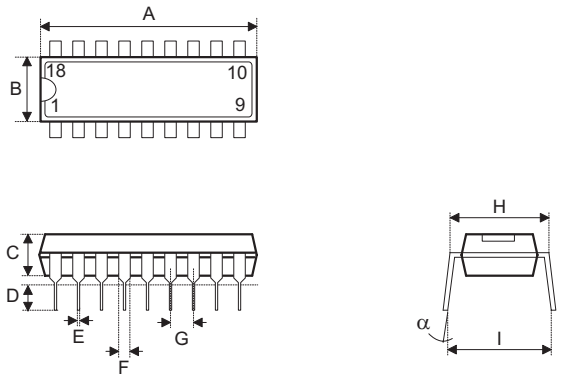
Place 0.1μF capacitor as close to $\overline{\text{RESET}}$ pin as possible.

Place 6MHz crystal as close to OSC1 and OSC2 pins as possible.

Components with * are used for EMC issue.

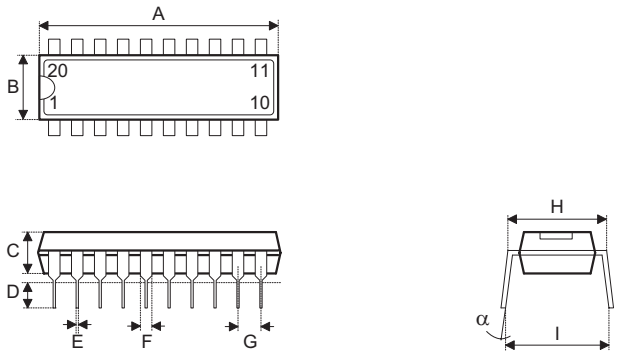
Package Information

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
α	0°	—	15°

20-pin DIP (300mil) Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	1020	—	1045
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°

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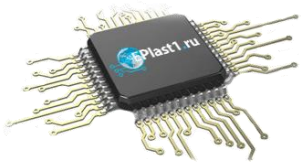
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