ADNS-3080
Optical Mouse Sensor

Product Overview

Description

High Performance Optical Mouse Sensor for Optimum Precision Navigation Performance in Mice Applications

The Avago Technologies' ADNS-3080 is a high-end addition to the ADNS family of optical mouse sensors. This high performing sensor was designed specially for mice applications in both gaming and office environments, enabling it to navigate on virtually all surfaces.

The ADNS-3080 is based on a new, faster architecture with improved navigation performance, which measures changes in position by optically acquiring sequential surface images of over 6400 fps and mathematically determining the direction and magnitude of movement. The sensor is capable of sensing high-speed mouse motion—up to 40 inches per second and acceleration up to 15g—for increased user precision and smoothness.

The ADNS-3080 along with the ADNS-2120/ADNS-2120-001 lens, ADNS-2220/ADNS-2220-001 clip and HLMPED80-XX000 form a complete, compact optical mouse tracking system. There are no moving parts, which means high reliability and less maintenance for the end user. In addition, precision optical alignment is not required, facilitating high volume assembly. The sensor is programmed via registers through a four-wire serial port. It is packaged in a 20-pin staggered dual inline package (DIP).

Theory of Operation

The ADNS-3080 is based on Optical Navigation Technology. It contains an Image Acquisition System (IAS), a Digital Signal Processor (DSP), and a four-wire serial port.

The IAS acquires microscopic surface images via the lens and illumination system provided by the ADNS-2120, ADNS-2220 and HLMP-ED80-XX000. These images are processed by the DSP to determine the direction and distance of motion. The DSP calculates the (delta) x and (delta) y relative displacement values. The microcontroller then reads the values through the sensor serial port.

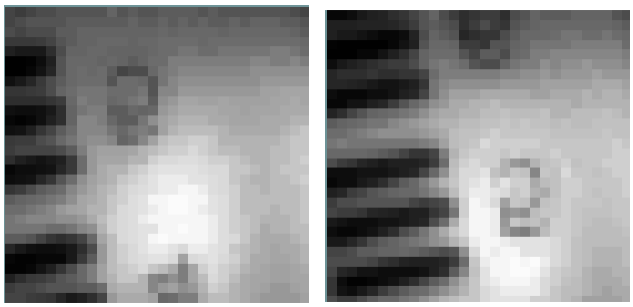
Features

- High speed motion detection – up to 40 ips and 15g
- New architecture for greatly improved optical navigation technology
- Programmable frame rate over 6400 frames per second
- SmartSpeed self-adjusting frame rate for optimum performance
- Serial port burst mode for fast data transfer
- 400 or 1600 cpi programmable resolution
- Single 3.3 volt power supply
- Four-wire serial port dedicated for efficient communications
- Features for increased speed with Chip Select, Power Down, and Reset pins

Applications

- Mice for game consoles and computer games
- Mice for desktop PC's, Workstations, and portable PC's
- Integrated input devices
- Trackballs

Navigation by Two Images Comparison



A B

Figure 1. The Navigation Engine identifies common features in sequential images to determine the direction and amount of mouse movement. Image B was taken while the mouse was moving, a short time after image A.

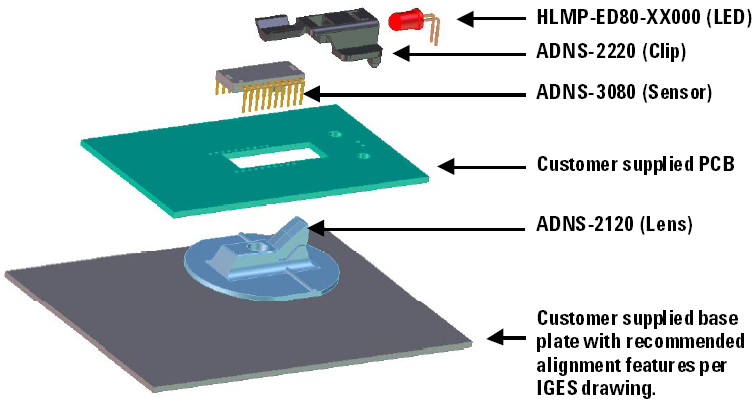


Figure 2. Exploded view drawing of optical mouse components.

Recommended Typical Application Block Diagram

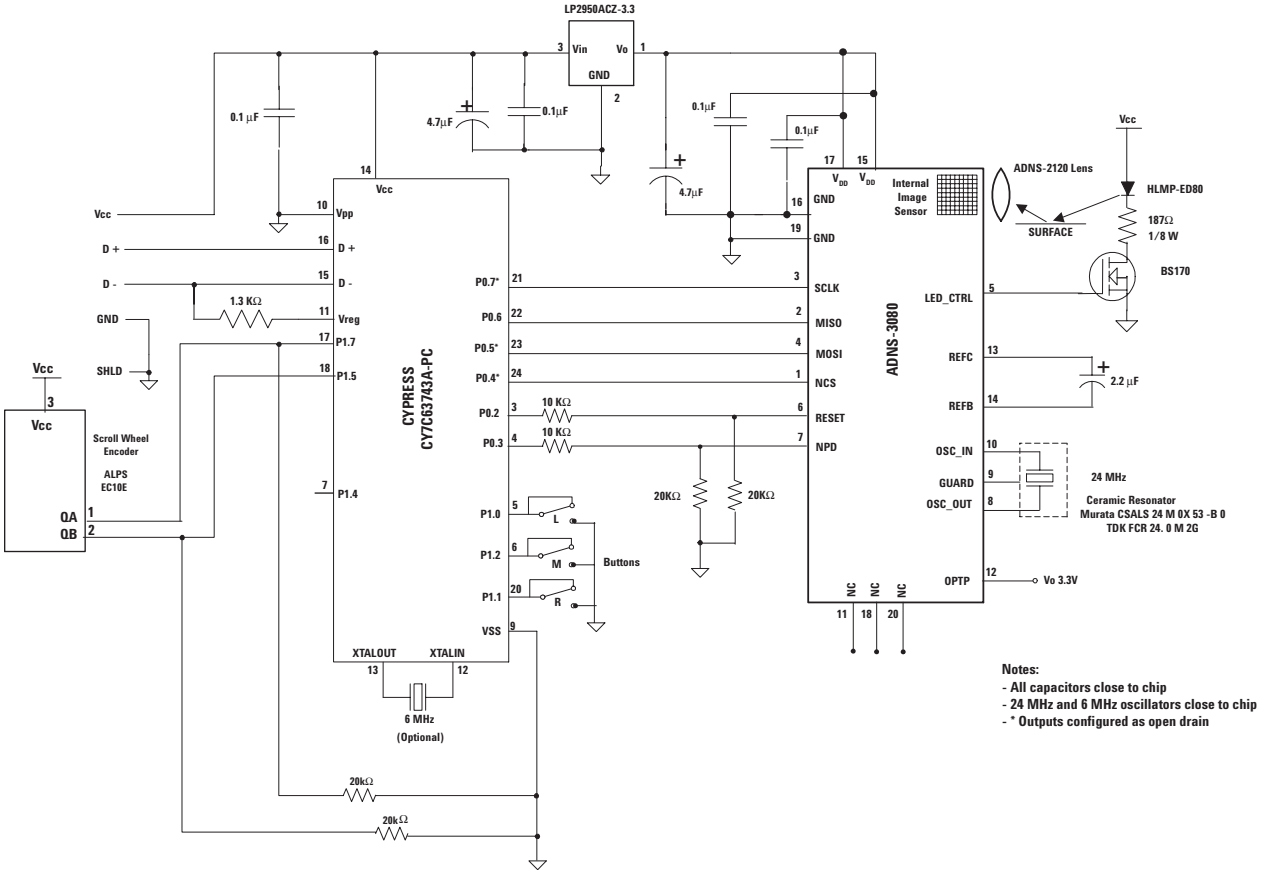


Figure 3. Circuit-level block diagram for a corded optical mouse solution using an Avago ADNS-3080 optical mouse sensor.

ADNS-3080 Key Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Operating Temperature	T_A	0		40	°C	
Power supply voltage	V_{DD3}	3.10	3.30	3.60	Volts	
DC Supply Current	I_{DD_AVG}			52	mA	DC average at 6469 fps. No DC load on LED_CTRL, MISO
Power Down Supply Current	I_{DDPD}		5	90	µA	NPD=GND; SCLK, MOSI, NCS=GND or V_{DD3}; RESET=V_{DD3}
Oscillator Frequency	f_{CLK}	23	24	25	MHz	Set by ceramic resonator
Resonator Impedance	X_{RES}			55	Ω	
Distance from lens reference plane to surface	Z	2.3	2.4	2.5	mm	Results in ±0.2 mm DOF
Speed	S	0		40	in/sec	@ 6469 fps
Acceleration	A			15	G	@ 6469 fps
Light level onto IC	IRR_{INC}	20 24 100 120		6,000 7,200 6,000 7,200	mW/m^2 mW/m^2 mW/m^2 mW/m^2	l = 639 nm, FR=1500 fps l = 875 nm, FR=1500 fps l = 639 nm, FR=6469 fps l = 875 nm, FR=6469 fps
Frame Rate	FR	2000		6469	Frames/s	See Frame_Period register section

Optical Mouse Design References

Datasheet ADNS-3080 Optical Mouse Sensor

Datasheet ADNS-2120 Lens

Datasheet ADNS-2220 LED Assembly Clip

Datasheet HLMP-ED80-XX000 LED

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

AV02-1164EN - April 10, 2008

AVAGO TECHNOLOGIES