Agilent ADNS-5020
Small Form Factor Optical Mouse Sensor
Preliminary Product Overview

Description

Small Form Factor Optical Mouse Sensor for Optimum Precision Navigation Performance in Mice Applications

The Agilent Technologies' ADNS-5020 is an entry-level, small form factor optical mouse sensor. With many built-in features including an internal 24MHz oscillator and LED driver, this minimizes requirements for external components. Also, this sensor is optimized for LED-based corded applications in home and office environments, enabling navigation on virtually all surfaces.

The ADNS-5020 is based on enhanced architecture for better navigation performance. Changes in position are measured by optically acquiring sequential surface images. The direction and magnitude of movement is then mathematically determined. The ADNS-5020 is capable of high-speed motion detection – up to 14ips velocity, and 2g acceleration. Frame rate is adjusted internally to optimize surface tracking performance.

The ADNS-5020 along with the ADNS-5100 lens, ADNS-5200 clip and HLMP-ED80 LED form a complete and compact mouse tracking system. There are no moving parts, which means high reliability and less maintenance for the end user. Also, precision optical alignment is not required, facilitating high volume assembly. Housed in an 8-pin staggered dual in-line package (DIP), the sensor is programmed via registers through a three-wire SPI interface.

Features

- **Small form factor, 8-pin package**
- **Built-in LED driver for simpler circuitry**
- **High speed motion detection up to 14 ips and 2g**
- **SmartSpeed self-adjusting frame rate for optimum performance**
- **Internal oscillator – no clock input needed**
- **Selectable 500 and 1000 cpi resolution**
- **Operating voltage: 5V nominal**
- **Three-wire serial interface**
- **Minimal number of passive components**

Applications

- **Optical Mice**
- **Optical trackballs**
- **Integrated input devices**

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Navigation by Two Images Comparison

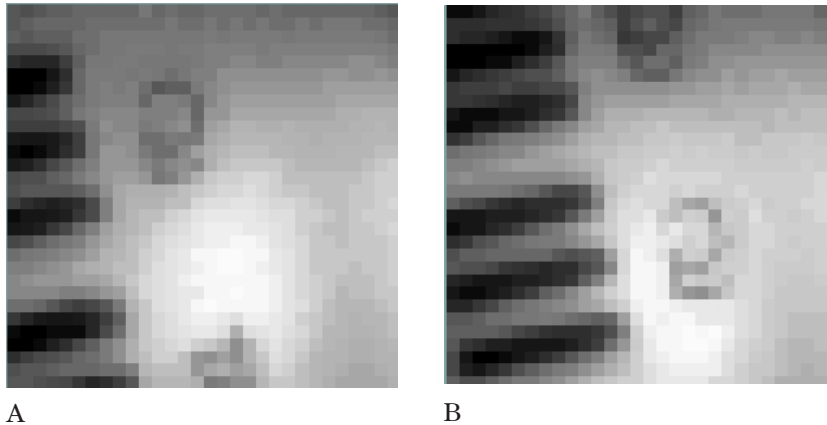A   B

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 in the northwest direction, a short time after image A.

Theory of Operation

The ADNS-5020 is based on Optical Navigation Technology, which contains an Image Acquisition System (IAS), a Digital Signal Processor (DSP), and a three wire serial port.

The IAS acquires microscopic surface images via the lens and illumination system. These images are processed by the DSP to determine the direction and distance of motion. The DSP calculates the Δx and Δy relative displacement values. An external microcontroller reads the Δx and Δy information from the sensor serial port. The microcontroller then translates the data into PS2 or USB signals before sending them to the host PC.
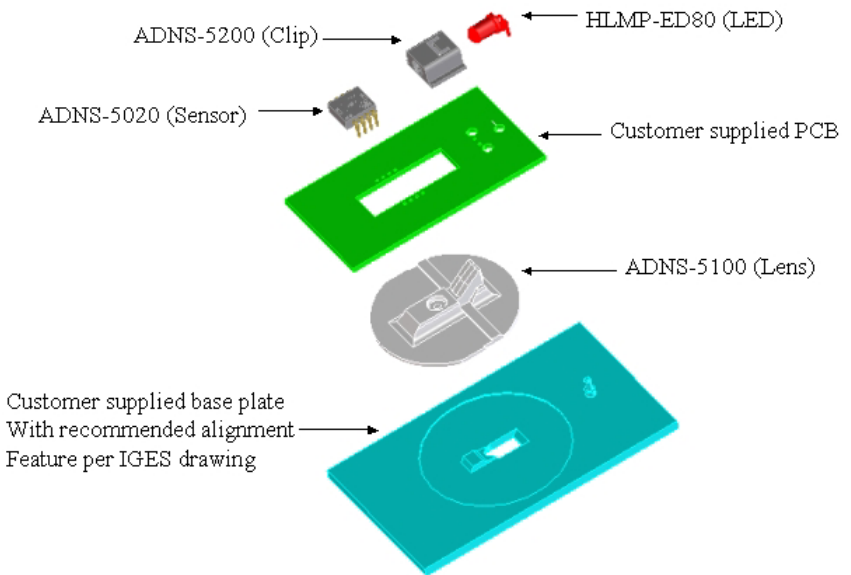

Figure 2. Exploded view drawing of optical mouse components.

ADNS-5020 Key Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Operating Temperature	TA	0		40	°C	
Power supply voltage	V_{DD3}	4.0	5.0	5.25	Volts	
DC Supply Current in various modes	I_{DD_AVG}			TBD	mA	Average current, including LED current. No load on SDIO.
Distance from lens reference plane to surface	Z	2.3	2.4	2.5	mm	Results in ±0.2 mm DOF
Speed	S	0		14	in/sec	
Acceleration	A			2	g	

Optical Mouse Design References

Datasheet ADNS-5020 Optical Mouse Sensor

Datasheet ADNS-5100 Lens

Datasheet ADNS-5200 LED Assembly Clip

Datasheet HLMP-ED80 LED

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For product information and a complete list of distributors, please go to our web site.

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