

# ADNK-2133

## Optical Mouse Designer's Kit



### Product Overview

#### Description

Avago Technologies and Freescale Semiconductor have joined forces to produce a new wireless optical mouse reference design kit. Based on the new Avago ADNS-2030 low power optical mouse sensor and the powerful Freescale MC68HC908QY4/MC68HC908JB12 USB microcontroller, this reference design kit provides a power efficient and feature-rich solution.

The Avago ADNS-2030 optical mouse sensor, a 16-pin staggered dual inline package (DIP), is based on innovative power management architecture with relatively good navigation performance. It is able to measure changes in position by optically acquiring sequential surface images of over 2300 fps and mathematically determining the direction and magnitude of movement.

The ADNS-2030 along with the HDNS-2100 lens, HDNS-2200-001 clip and HLMP-ED80-XX000 form a complete, compact optical mouse tracking system. There are no mechanical 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.

The Freescale MC68HC908QY4/ MC68HC908JB12 is a member of the low-cost, high-performance M68HC08 Family of 8-bit microcontroller units (MCUs). The M68HC08 Family is a Complex Instruction Set Computer (CISC) with a Von Neumann architecture. All MCUs in the family use the enhanced M68HC08 central processor unit (CPU08) and are available with a variety of modules, memory sizes and types, and package types.

#### Features

- Windows® 98SE, Windows 2000, and Windows XP compatibility
- USB 2.0 low-speed compliance
- User identity code to avoid conflict with other devices
- High reliability
- Precise wireless optical navigation technology
- No mechanical moving parts
- Smooth surface navigation
- Programmable mouse sensor frame speed up to 2300 frames per sec (fps)
- Accurate motion up to 14 ips
- 800 cpi resolution
- A high data rate 27-MHz RF link
- 4.8 kbps transmission data rate
- 2 meter communication distance
- 3361 compatible device for RF receiver design
- Power conservation mode during times of no movement

The MC68HC908QY4 has an internal oscillator circuit which can generate a clock of 12.8 MHz with no external components needed. The auto wakeup module generates a periodic interrupt during stop mode to wake the part up without requiring an external signal. These features make the MC68HC908QY4 MCU suited for wireless optical mouse applications.

The features of the MC68HC908JB12 include a configurable universal serial bus (USB), which makes this MCU suited for personal computer human interface devices (HID) applications, such as mice. The enhanced timer

function also allows it to capture and decode data easily, especially for high data rate wireless HID applications.

This kit is connectable to a PC via the USB port. It is also based on the 27 MHz RF technology, the data generated from displacement detection/button status in the optical mouse is encoded with a pre-defined serial type protocol handled by firmware in the MCU. In the RF stage, the encoded data is used for FSK modulation. The captured data from the RF receiver stage is decoded with a corresponding packet format used for mouse applications. The final data is sent to the host through the USB interface.

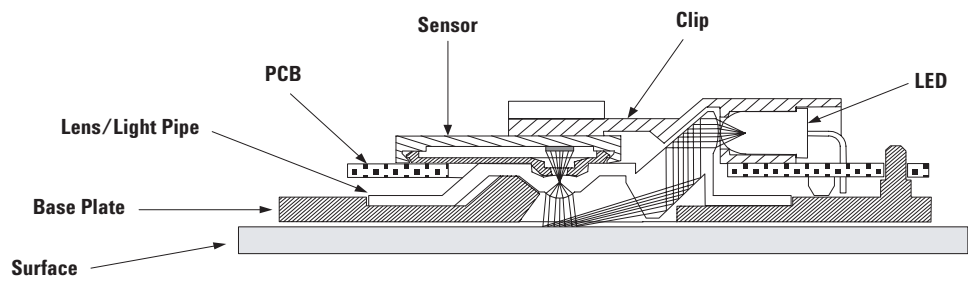


Figure 1. Sectional view of PCB assembly highlighting optical mouse components (optical mouse sensor, clip, lens, LED, PCB and base plate) in the mouse.







## Kit Components

This designer's kit contains the following components:

Part Number	Description	Name	Quantity
ADNK-2133 Mouse Set	Cordless Optical Mouse Optical Mouse Receiver	Mouse Receiver	1 1
ADNS-2030	Soild-State Optical Mouse Sensor	Sensor	5
MC68HC908JB12	Freescale USB Microcontroller	USB Microcontroller	5
MC68HC908QY4	Freescale low-cost Microcontroller	Microcontroller	5
HDNS-2100	Round Lens Plate	Lens	5
HDNS-2100-001	Trimmed Lens Plate	Lens	5
HDNS-2200	LED Assembly Clip (Black)	LED Clip	5
HDNS-2200-001	LED Assembly Clip (Transparent)	LED Clip	5
HLMP-ED80-XX000	639 nm T1 _ (5 mm) Diameter LED	LED	5
ADNK-2133 CD	Includes Documentation and Support Files for ADNK-2133 <ul style="list-style-type: none"><li>• Documentation<ul style="list-style-type: none"><li>a. ADNS-2030 Data Sheet</li><li>b. MC68HC908JB12 &amp; MC68HC908QY4 Data Sheet</li><li>c. HDNS-2100 Data Sheet</li><li>d. HDNS-2200-001 Data Sheet</li><li>e. HLMP-ED80-XX000 LED Data Sheet</li></ul></li><li>• Hardware Support Files<ul style="list-style-type: none"><li>a. ADNK-2133 BOM List</li><li>b. ADNK-2133 Schematic</li><li>c. IGES Base Plate Feature File</li><li>d. Gerber File</li></ul></li><li>• Software Support Files<ul style="list-style-type: none"><li>a. Microcontroller Firmware</li></ul></li></ul>		1
Metrowerks CD	Includes Software Development Studio for Freescale MC68HC08 Microcontrollers <ul style="list-style-type: none"><li>a. CodeWarrior Debugger Software</li><li>b. CodeWarrior Assembler/Compiler Software</li><li>c. Code Examples</li><li>d. User Manual</li></ul>		1



**[www.motorola.com/semiconductors](http://www.motorola.com/semiconductors)**

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

For technical assistance call:

Freescale Literature Distribution  
P.O. Box 5405  
Denver, Colorado 80217  
1-800-521-6274 or 480-768-2130

Japan:

Freescale Japan Ltd.  
SPS, Technical Information Center  
3-20-1, Minami-Azabu, Minato-ku  
Tokyo 106-8573, Japan  
81-3-3440-3569

Asia/Pacific:

Freescale Semiconductors H.K. Ltd.  
Silicon Harbour Centre  
2 Dai King Street  
Tai Po Industrial Estate  
Tai Po, N.T., Hong Kong  
852-26668334

For product information and a complete list of distributors, please go to our web site: **[www.avagotech.com](http://www.avagotech.com)**

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies, Limited in the United States and other countries. Data subject to change. Copyright © 2008 Avago Technologies, Limited. All rights reserved. Obsoletes 5989-1223EN  
AV02-1020EN - January 28, 2008

**Avago**  
TECHNOLOGIES