

ADNK-3043-ND24

USB 2.4GHz RF Wireless Low-Power Mouse Designer's Kit



Product Overview

Description

Avago Technologies, Texas Instruments, Nordic Semiconductor and Morrihan International Trading (Shanghai) Co. Ltd. have joined forces to produce a new wireless LED mouse reference design kit. The mouse is based on the new Avago Technologies ADNS-3040 low power LED mouse sensor, Texas Instruments MSP430F1222 microcontroller and Nordic Semiconductor nRF2402 2.4GHz RF transmitter. The receiver dongle consists of Nordic nRF2401A 2.4GHz RF transceiver and Cypress CY7C63231A enCoRe™ USB controller. This reference design kit provides a power-efficient and feature-rich solution in one neat package.

The Avago Technologies ADNS-3040 low power LED-based navigation sensor, an 18-pin staggered dual in-line package (DIP), is based on SmartSpeed technology, which self-adjust frame rate for optimum surface-tracking performance. The sensor measures changes in position by optically acquiring sequential surface images (frames) and mathematically determining the direction and magnitude of movement. Its high-performance, low-power architecture is capable of sensing high-speed mouse motion while prolonging battery life, two performance areas essential in demanding wireless applications.

The ADNS-3040 sensor, along with the ADNS-3120-001 lens, ADNS-2220 clip and the HLMP-ED80 LED form a complete and compact LED mouse tracking system. There is no moving part, which means high reliability and less maintenance for the end user. In addition, precision optical alignment is not required, facilitating high-volume assembly.

Features

- Complete LED mouse reference design kit
- Windows® 98SE, Windows 2000 and Windows XP compatibility
- USB 1.0 low-speed compliance
- User identity code to avoid conflict with other devices
- High reliability
- Smooth surface navigation
- Enhanced SmartSpeed self-adjusting frame rate for optimum performance
- High speed motion detection up to 20 ips and 8 G
- 800 cpi resolution
- No mechanical moving parts
- A high data rate 2.4GHz RF link
- Transmission data rate up to 1 Mbps
- Up to 15 meters communication distance
- Self-adjusting power-saving modes for longest battery life
- Minimal number of passive components



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The Texas Instruments MSP430F1222 is the ultra low-power mixed signal microcontroller with a built-in 16-bit timer, 10-bit A/D converter with integrated reference and data transfer controller (DTC) and twenty-two I/O pins. In addition, the MSP430F1222 microcontroller has built-in communication capability using asynchronous (UART) and synchronous (SPI) protocols. The architecture, combined with five low-power modes is optimized to achieve extended battery life on wireless application.

The Nordic nRF2402 and nRF2401A are low-power, single-chip radio transmitter and transceiver respectively for the world wide 2.4 - 2.5 GHz ISM band. In this reference design mouse the nRF2402 is used to implement the transmit-only function. It consists of a fully integrated frequency synthesizer, a power amplifier, a crystal oscillator and a modulator. Configurations of the nRF2402 transmitter are done via the SPI serial interface. The ShockBurst™ function utilizes the on-board FIFO to clock in data from the microcontroller at low speed but transmits at high speed. The short-duration transmission minimizes the transmitter on time thus conserving precious battery power. Typical power consumption is 10 mA @ -5 dB of RF power. The nRF2402 also automatically validates the packets address and calculates CRC, further reducing the microcontroller's work load.

The nRF2401 transceiver and the Cypress CY7C63231 are used in the receiver dongle. The nRF2401 including all inductors and filters are integrated in each single chip which gives the lowest cost solution to the end user. The Cypress CY7C63231A enCoRe™ is a revolutionary chip that integrates numerous common components, including breakthrough crystal-less oscillator. The result is an overall reduction in board components and reduced system cost. The EPROM based microcontroller allows easy firmware modification, as well as storage of Vendor and Product ID™s without an external EEPROM.

This kit is connectable to a PC via the USB port. It is based on the 2.4GHz RF technology, the data generated from displacement detection / button status in the LED 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 GFSK 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.

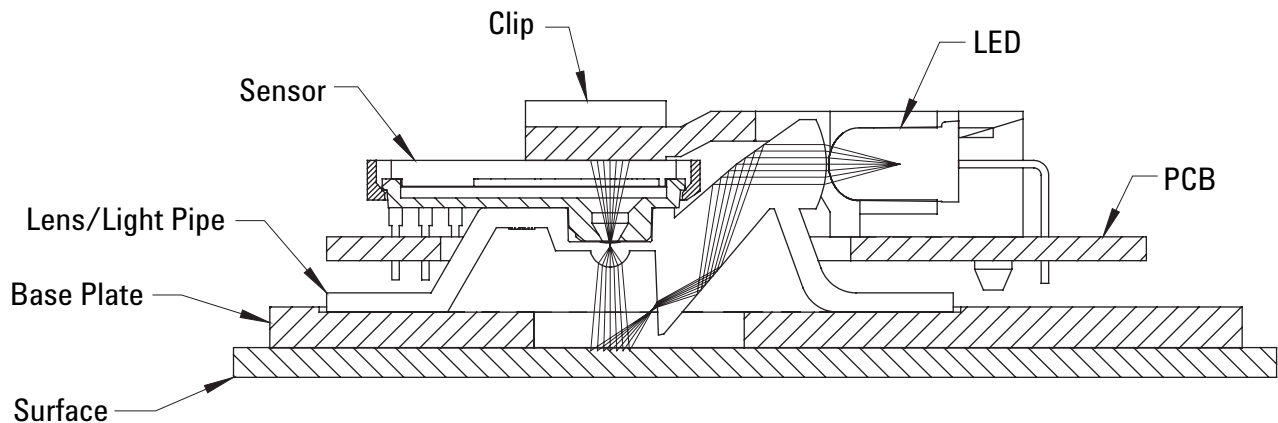


Figure 1. Sectional view of PCB assembly highlighting all optical mouse components (optical mouse sensor, clip, lens, LED, PCB, and base plate).

Schematic Design of Overall Circuit

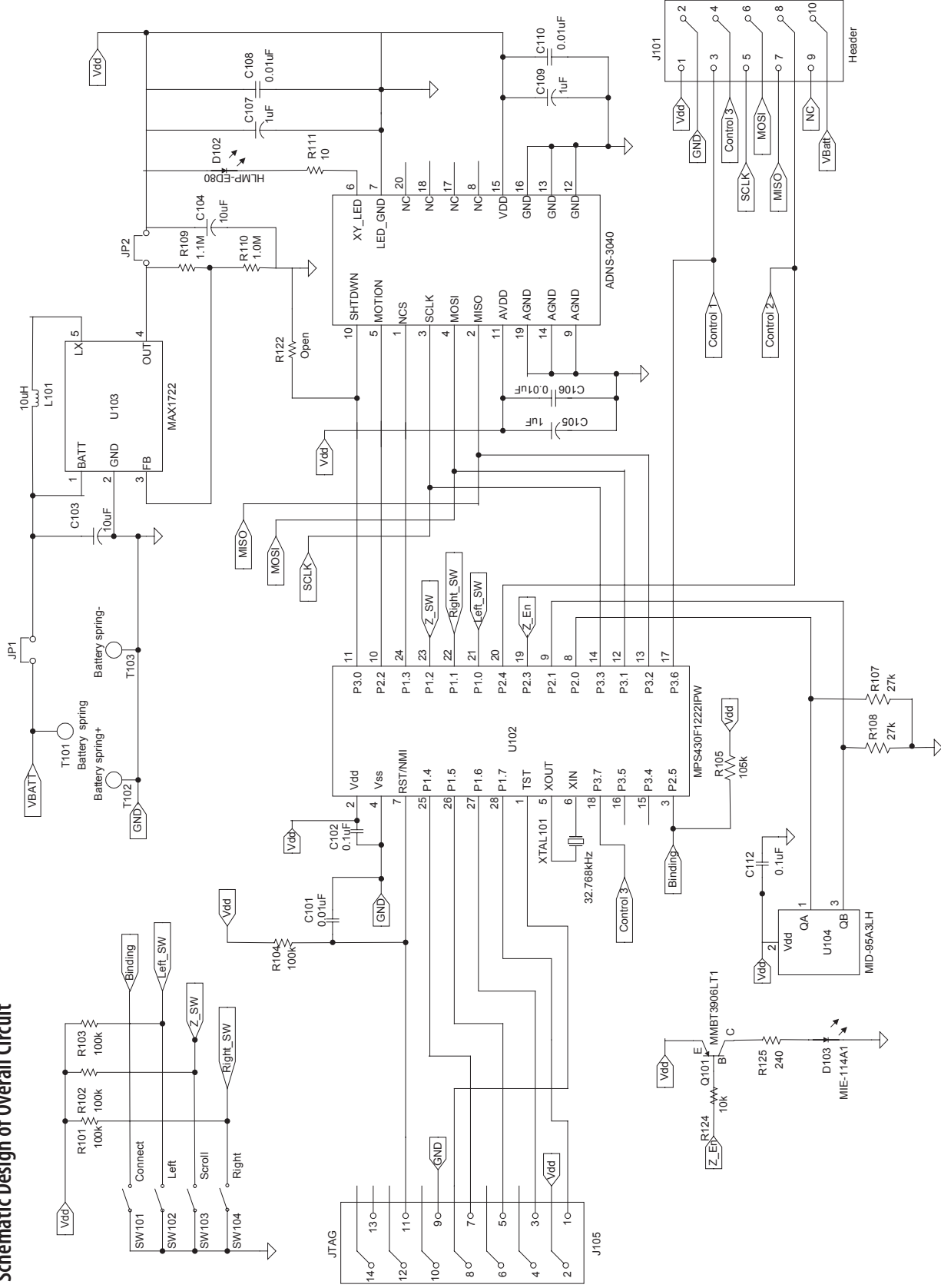


Figure 2. Circuit diagram of ADNS-3040 sensor, buttons and Z-wheel schematic in ADNK-6033-ND24 designer's kit wireless LED mouse

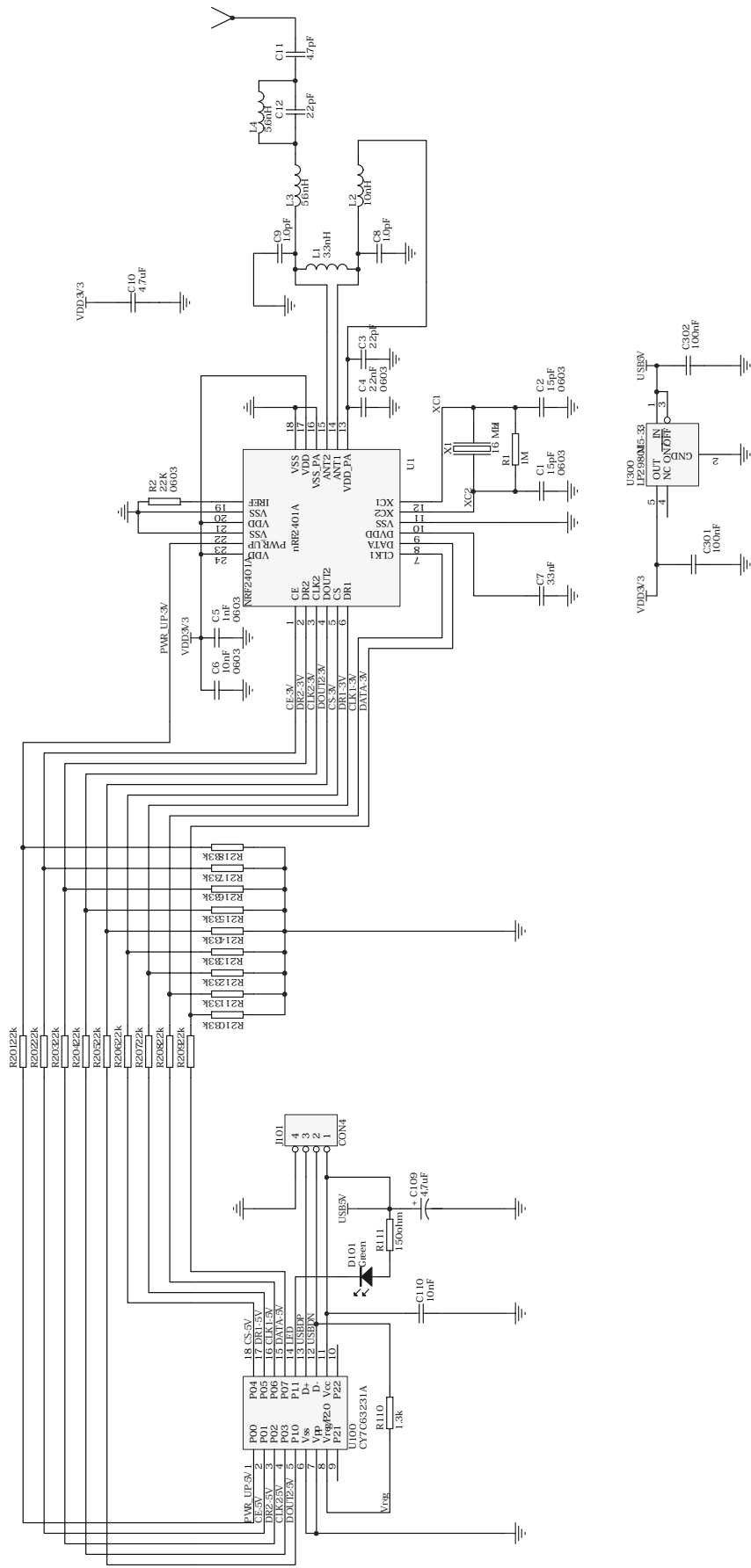


Figure 4. Circuit diagram of CY7C63231A enCoRe™ USB microcontroller and nRF2401 transceiver in ADNK-3043-ND24 designer's kit USB Dongle

Kit Components

The designer's kit contains components as follows:

Part Number	Description	Name	Quantity
ADNK-3043-ND24 Mouse Set	a. Wireless LED Mouse b. USB Dongle	Reference Design Mouse Set	1
ADNS-3040	LED Mouse Sensor	Sensor	5
ADNS-3120-001	LED Mouse Trim Lens Plate	Lens	5
ADNS-2220	LED Clip	LED Clip	5
HLMP-ED80	Light Emitting diode	LED	5
ADNK-3043-ND24 CD-ROM	Includes Documentation and Support Files for ADNK-3043-ND24 Documentations a. ADNS-3040 Ultra Low Power Optical Mouse Data Sheet b. ADNK-3043-ND24 Optical Mouse Designer's Kit Product Overview c. ADNK-3043-ND24 Optical Mouse Designer's Kit Design Guide d. Battery Life Calculation for An Ultra Low-Power Wireless Optical Mouse Application Note 5243 e. Texas Instrument MSP430F1222 Microcontroller Datasheet f. Nordic Semiconductor nRF2401A RF Transceiver Datasheet g. Nordic Semiconductor nRF2402 RF Transmitter Datasheet Hardware Support Files a. ADNK-3043-ND24 BOM List b. ADNK-3043-ND24 Schematic c. ADNK-3043-ND24 Gerber File d. IGES Base Plate Feature File Software Support Files a. Microcontroller Firmware		1

Ordering Information

For ordering information, please contact your local Avago Technologies sales representative.

Avago Technologies' Partners

For partner product information and list of distributors, please go to their respective website.



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