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Small Form Factor, Dual-Channel, Optical AFE with Enhanced Power-Saving Features

MAX86184

General Description

The MAX86184A is a small form factor yet fully featured optical data acquisition system ideal for various optical applications including photoplethysmography and optical pulse oximetry. It is a low power and high signal-to-noise ratio (SNR) integrated solution designed for the demanding requirements of medical and wearable devices. It is available in a small, 25-bump, 1.81mm × 1.81mm, WLP package, and requires minimal external hardware components that enable the smallest system level solution.

The MAX86184A includes two high-resolution optical-readout signal processing channels that can simultaneously sample any two combinations of its four photodiode inputs. It features robust ambient light cancellation and one high-current LED driver DAC (255mA maximum). The MAX86184A supports up to 14 LEDs.

The MAX86184A implements a range of features to reduce both AFE and system level power such as variable sample rates, sensor synchronization input/output, and deep FIFO.

The MAX86184A is fully configurable through software registers and the digital output data is stored in a 256-word FIFO. The FIFO allows the MAX86184A to be connected to a microcontroller or processor on a shared SPI bus and operate in fully autonomous mode for low-power battery applications. The MAX86184A operates on a switched 1.8V main supply voltage (V_{DD}). Driving the LEDs requires the system to provide an additional 2.5V (ADM_EN = 0) or 3.1V (ADM_EN = 1) to 5.5V power rail (V_{LED}). The voltage levels of the digital input/output pins are referenced to the V_{DD} rail (1.8V typ).

Applications

- Wearable Devices for Fitness, Wellness, and Medical Applications
- Battery-Powered Devices
- Space-Constrained Locations Like:
  - Smart Rings
  - Earbuds, True Wireless, Hearing Aids…
  - Watches, Armbands…
- Optimized Performance to Detect:
  - Optical Heart Rate
  - Heart Rate Variability
  - Oxygen Saturation (SpO_2)
  - Muscle and Tissue Oxygen Saturation (SmO_2 and StO_2)
  - Maximum Oxygen Consumption (VO_2 Max)

Product Highlights

- Dual-Channel, Optical Data Acquisition System
  - Up to 10 Fully Configurable Measurements
  - Four Photodiode Inputs
  - Up to 14 LEDs
- High SNR
  - 98dB Nyquist SNR Extendable to 117dB
  - Up to 48µA LED-to-PD Crosstalk Removal
- Reduces System Power
  - 15µW (16SPS, One Channel, Three MEAS/FR)
  - >70dB SNR at IPDm_IN = 1µA (ADM_EN = 1)
  - Individualized Sampling Rate per Measurement
- Excellent Ambient Light Cancellation
  - 200µA DC Ambient Cancellation
  - 80dB at 100Hz Ambient Light Rejection
- Highly Integrated Solution
  - 1.81mm × 1.81mm, 25WLP

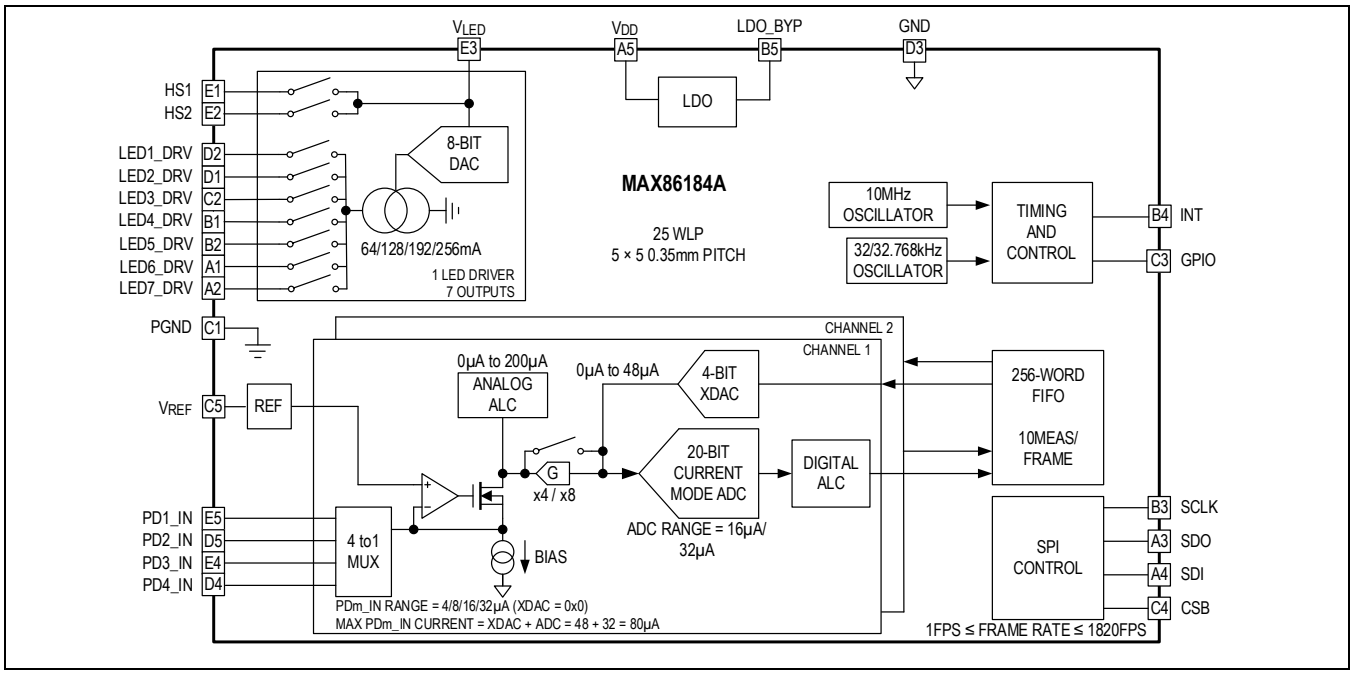
Ordering Information appears at end of data sheet.

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Simplified Block Diagram



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