

## Low-Noise AFE for Pulse Oximeter and Heart Rate Monitor

### General Description

The MAX86170B is an ultra-low-power optical data acquisition system with both transmit and receive channels. On the transmitter side, the MAX86170B has four LED driver output pins, programmable from three high-current, 8-bit LED drivers. On the receiver side, MAX86170B has a low-noise charge integrating front-end that includes a 20-bit ADC and best-in-class ambient light cancellation (ALC) circuit, producing the highest performing integrated optical data acquisition system on the market today.

Due to its low power consumption, compact size, ease-and flexibility-of-use, the MAX86170B is ideal for a wide variety of optical sensing applications such as pulse oximetry and heart rate detection.

The MAX86170B operates on a 1.8V main supply voltage and a 3.1V to 5.5V LED driver supply voltage. The device supports both I<sup>2</sup>C- and SPI-compatible interfaces in a fully autonomous way. The device has a large 256-word built-in FIFO. The MAX86170B is available in a compact WLP package 2.78mm x 1.71mm with 6 x 4, 0.4mm ball pitch.

### Applications

- Wearable Devices for Fitness, Wellness, and Medical Applications
- Clinical Accuracy
- Suitable for Wrist, Finger, Ear, and Other Locations
- Optimized Performance to Detect:
  - Optical Heart Rate
  - Heart-Rate Variability
  - Oxygen Saturation (SpO<sub>2</sub>)
  - Body Hydration
  - Muscle and Tissue Oxygen Saturation (SmO<sub>2</sub> and StO<sub>2</sub>)
  - Maximum Oxygen Consumption (VO<sub>2</sub> max)

### Benefits and Features

- Complete Single-Channel Optical Data Acquisition System
- Ultra Low-Power Operation for Wearable Devices
  - Low-Power Operation, Optical Readout Channel < 11µA at 25fps
  - Exposure Integration Period Ranging from 14.6µs to 117.1µs
  - Low Shutdown Current < 1µA
- Excellent Top-End Dynamic Range > 91dB in White Card Loop-Back Test (Nyquist Sample-to-Sample Variance)
- Extended Dynamic Range up to 109dB (Averaging and Off-Chip Filtering)
- Supports Frame Rates from 1fps to 2.9kfps
- High Resolution 20-Bit Charge Integrating ADC
- Supports Two PD Inputs for Multiparameter Measurements
- Supports Four LED Driver Output Pins Generated from Three 8-Bit LED Current Drivers
- Low Dark Current Noise of < 50pA RMS (Sample to Sample Variance in 117.1µs Integration Time)
- Excellent Ambient Range and Rejection Capability
  - 200µA Ambient Photodiode Current
  - > 70dB Ambient Rejection at 120Hz
- Miniature 2.78mm x 1.71mm, 6 x 4, 0.4mm Ball Pitch WLP Package
- -40°C to +85°C Operating Temperature Range

Visit [Web Support](#) to complete the nondisclosure agreement (NDA) required to receive additional product information.

Rev. 2

**DOCUMENT FEEDBACK**

**TECHNICAL SUPPORT**

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