

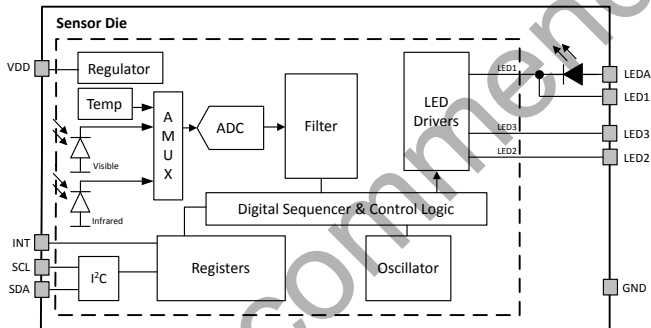
Si1144-AAGX Data Short

Optical Heart Rate Sensor Module with I²C Interface and HR Measurement Software

The Si1144-AAGX is a low-power, reflectance-based, heart rate sensor. This optical heart rate sensor module includes an analog-to-digital converter, integrated high-sensitivity photodiodes, host communications processor, a green high efficiency LED, and three integrated LED drivers with ninety selectable drive levels. The Si1144-AAGX offers excellent performance under a wide dynamic range and a variety of light sources from 525 nm to 940 nm. The Si1144-AAGX devices are provided in a 10-lead 4.9 x 2.85 x 1.2 mm LGA module package and are capable of operation from 1.71 to 3.6 V over the -40 to +85 °C temperature range.

Applications:

- Fitness Bands
- Smart Watches
- Other Wearables
- Healthcare

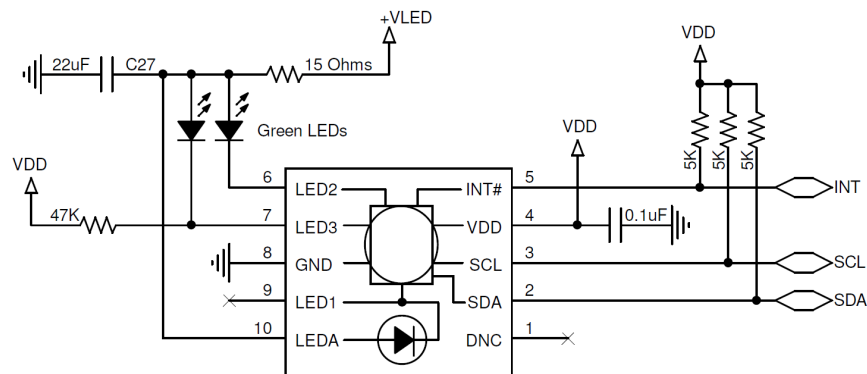


Si1144-AAGX Sensor Module Block Diagram

KEY FEATURES

- Fully integrated heart rate sensor with ARM code library for extracting HR from the optical sensor data
 - Green LED with lens
 - High-sensitivity photodiode
 - Low-noise analog-to-digital converter and filtering
 - LED drivers
 - Optical blocking
 - Host communications and interrupts
- Optional Movement compensation uses external accelerometer data
- Accurate sensing of weak blood flow signals on the wrist
- Three independent regulated LED drivers
 - Scalable from cost-sensitive single LED systems to high performance three LED systems
 - Programmable from 6 mA to 360 mA each
- Integrated green LED ideal for wrist based heart rate applications
 - Add up to 2 external LEDs
 - Broad spectral sensitivity supports green through 940 nm LEDs
- No additional optical blocking required
- Low power consumption
 - 1.71 to 3.6 V supply voltage
 - 25.6 μ s LED "on" time keeps total power consumption duty cycle low without compromising performance or noise immunity
 - < 500 nA standby current
 - Internal and external wake support
 - Built-in voltage supply monitor and power-on reset controller
- I²C serial communications
 - Up to 3.4 Mbps data rate
 - Slave mode hardware address decoding (0x5A)
- 10-lead 4.9 X 2.85 x 1.2 mm LGA Module package
- Temperature Range
 - -40 to +85 °C

1. Si1144-AAGX Information



Si1144-AAGX 4.9 x 2.85 x 1.3 mm LGA Module Application Schematic

Table 1.1. Recommended Operating Conditions

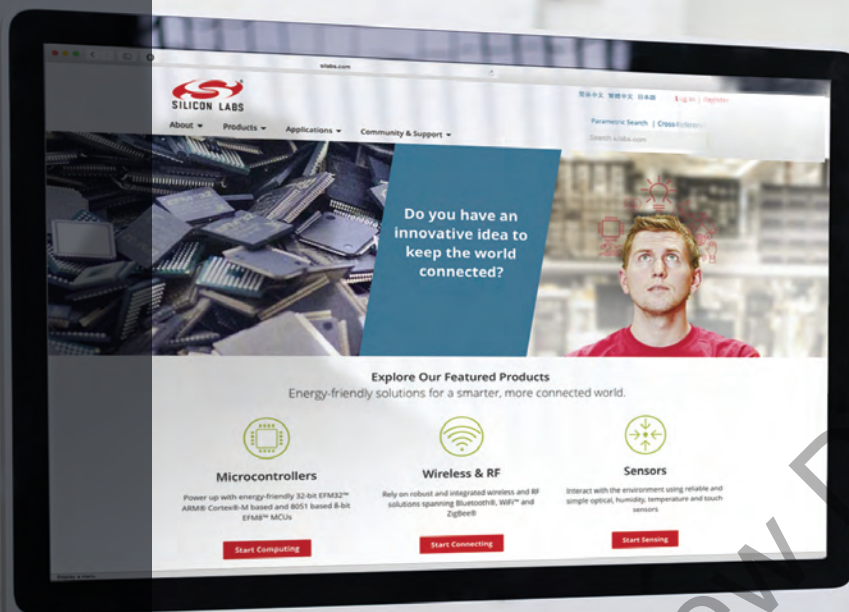
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|--|--|---|-----------------------|--------|-----------------------|--------------|
| V _{DD} Supply Voltage | V _{DD} | | 1.71 | — | 3.6 | V |
| V _{DD} OFF Supply Voltage | V _{DD_OFF} | OFF mode | -0.3 | | 1.0 | V |
| V _{DD} Supply Ripple Voltage ¹ | | V _{DD} = 3.3 V 1 kHz–10 MHz | — | — | 50 | mVpp |
| Operating Temperature | T | | -40 | 25 | 85 | °C |
| SCL, SDA, Input High Logic Voltage | I ² C _{V_{IH}} | | V _{DD} × 0.7 | — | V _{DD} | V |
| SCL, SDA Input Low Logic Voltage | I ² C _{V_{IL}} | | 0 | — | V _{DD} × 0.3 | V |
| LED Emission Wavelength | λ | | — | 525 | — | nm |
| LED Supply Voltage | V _{LED} | | 4.1 | — | 5.0 | V |
| LED Supply Ripple Voltage ¹ | | 0–30 kHz 30 kHz–100 MHz | — — | — — | 250 100 | mVpp mVpp |
| Start-Up Time | | V _{DD} above 1.71 V | 25 | — | — | ms |
| LED3 Voltage | | Start-up | V _{DD} × 0.7 | — | — | V |

Note:

1. Supply voltage ripple sensitivity depends on the voltage at the LEDx pins when turned on.

Table 1.2. Ordering Guide

| Part Number | Package | LED Drivers |
|-----------------|--------------------------------|---------------------------------------|
| Si1144-AAGX-GMR | 4.9 x 2.85 x 1.2 mm LGA Module | 3 LED drivers, 1 green LED integrated |



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