

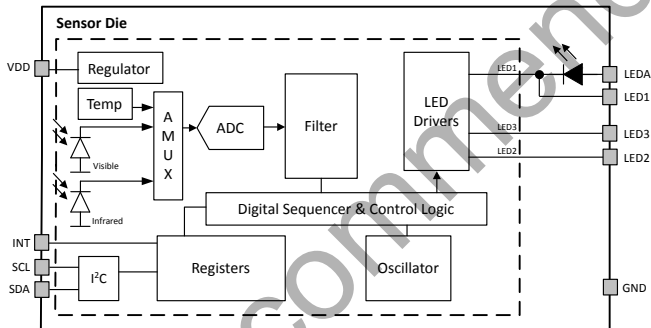
# Si1144-AAGX Data Short

## Optical Heart Rate Sensor Module with I<sup>2</sup>C 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

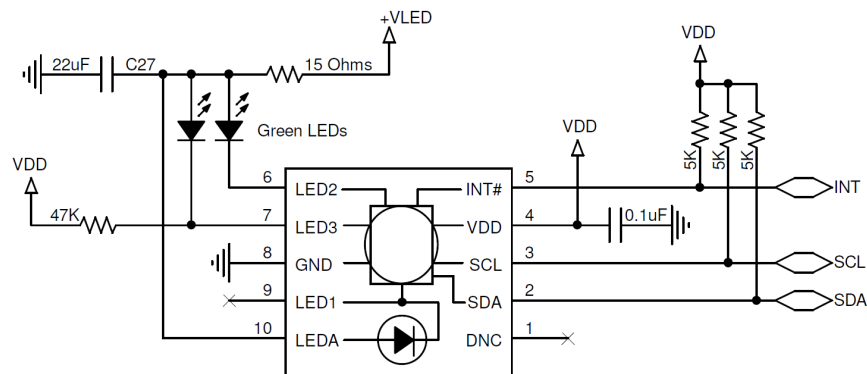


Si1144-AAGX Sensor Module Block Diagram

### 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  $\mu$ 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
- I<sup>2</sup>C 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

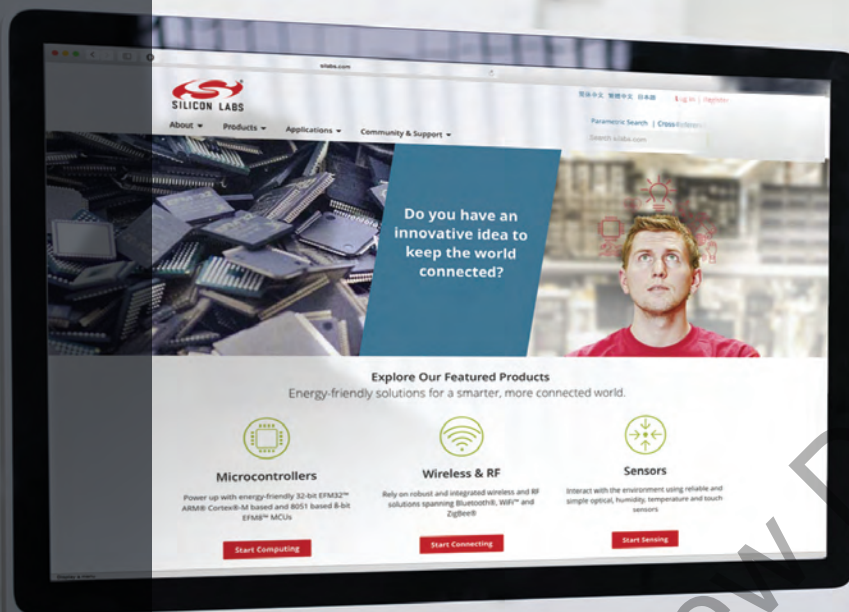
| Parameter  | Symbol                          | Test Condition                          | Min                   | Typ    | Max                   | Unit         |
|--|---------------------------------|---|-----------------------|--------|-----------------------|--------------|
| V <sub>DD</sub> Supply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