Si1144-A10 Data Short

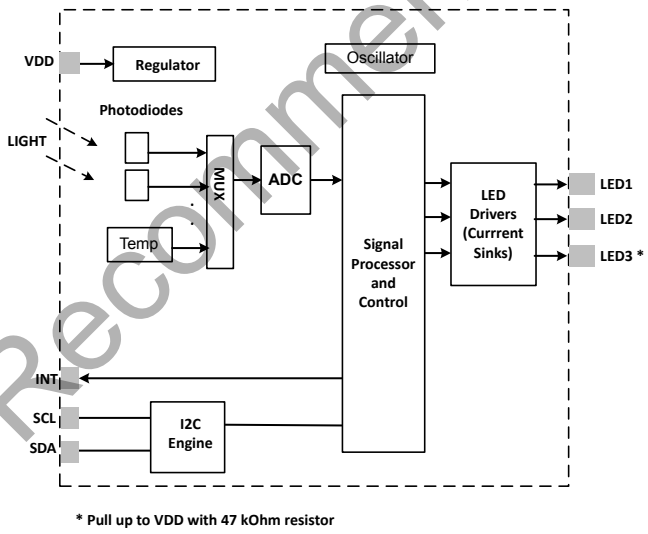
Optical Heart Rate Sensor Chip with I²C Interface and HR Measurement Software Library

The Si1144-A10 is a low-power, reflectance-based, heart rate sensor device combined with a Cortex-M ARM code library containing the heart rate extraction algorithm. The heart rate algorithm provided in the library includes motion compensation using an external accelerometer and is optimized to be accurate even in the difficult area of the wrist.

This optical heart rate sensor chip includes an I²C digital interface, a programmable-event interrupt output, an analog-to-digital converter, integrated high sensitivity photodiodes, host communications processor, and three integrated LED drivers capable of 6 to 360 mA output current. The Si1144-A10 offers excellent performance under a wide dynamic range and a variety of light sources from 525 nm to 940 nm. The Si1144-A10 devices are provided in a 10-lead DFN 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

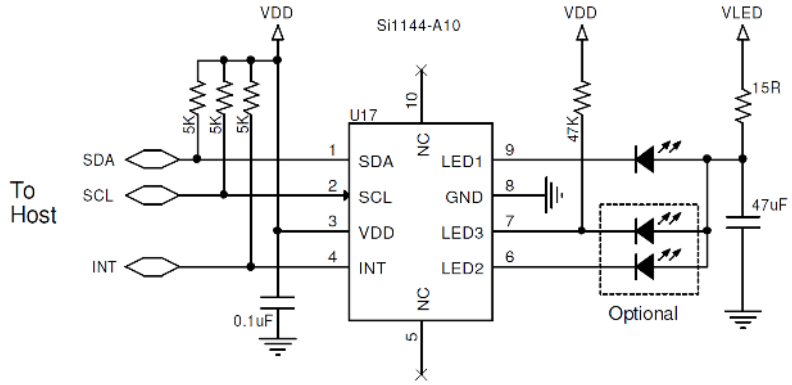


Si1144-A10 Sensor Block Diagram

KEY FEATURES

- Sensor with ARM Cortex-M code library for extracting HR
- Optional movement compensation uses external accelerometer data
- Accurate sensing optimized for reading heart rate from the wrist
- Integrated heart rate IC
  - High-sensitivity photodiode
  - Low-noise analog-to-digital converter and filtering
  - LED drivers
  - Host communications and interrupts
- Broad spectral sensitivity supports green through 940 nm LEDs
- Three independent regulated LED drivers
  - Scale cost-sensitive single LED systems to high performance three LED systems
  - Programmable from 6 to 360 mA each
- Low power consumption
  - 1.71 to 3.6 V supply voltage
  - Flexible duty cycle optimizes the power consumption.
  - < 500 nA standby current
  - Internal and external wake support
- Built-in voltage supply monitor and power-on reset controller
- I²C serial communications
  - Slave mode hardware address decoding (0x5A)
- Small outline 10-lead 2 mm x 2 mm DFN
- Temperature Range of –40 to +85 °C

1. Si1144-A10 Information



Si1144-A10 2 mm x 2 mm DFN Application Schematic

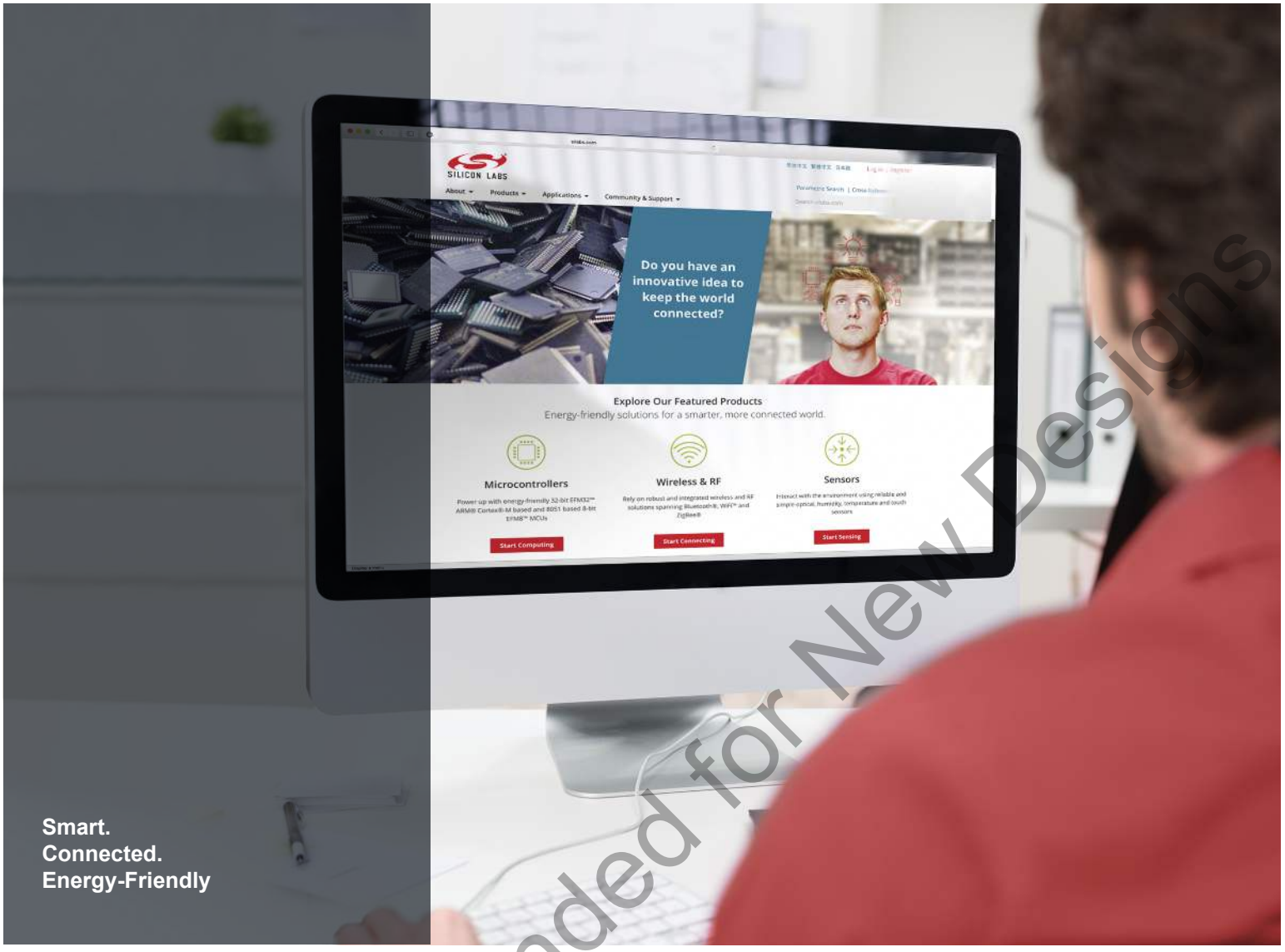
Table 1.1. Recommended Operating Conditions

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^2C_{VIH}		V_{DD} x 0.7	—	V_{DD}	V
SCL, SDA Input Low Logic Voltage	I^2C_{VIL}		0	—	V_{DD} x 0.3	V
LED Emission Wavelength	l		—	525	—	nm
LED Supply Voltage	VLED		4.1	—	5.0	V
LED Supply Ripple Voltage[1]		0–30 kHz	—	—	250	mVpp
		30 kHz–100 MHz	—	—	100	mVpp
Start-Up Time		V_{DD} above 1.71 V	25	—	—	ms
LED3 Voltage		Start-up	V_{DD} x 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-A10-GMR	2 mm x 2 mm DFN	3 LED drivers



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