

Si1144-A10 Data Short

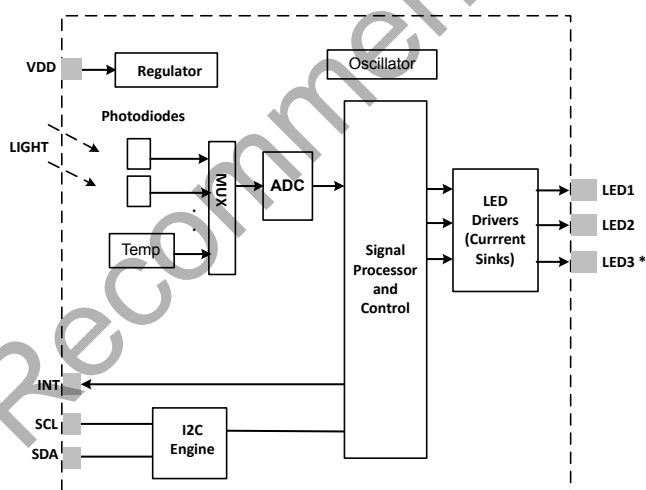
Optical Heart Rate Sensor Chip with I²C Interface and HR Measurement Software Library

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



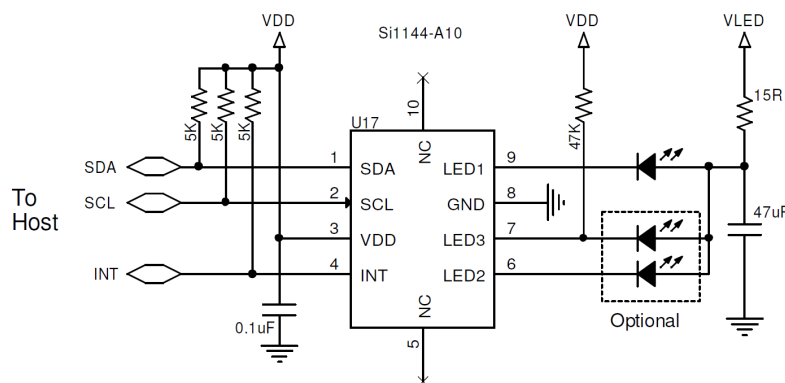
* Pull up to VDD with 47 kOhm resistor

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

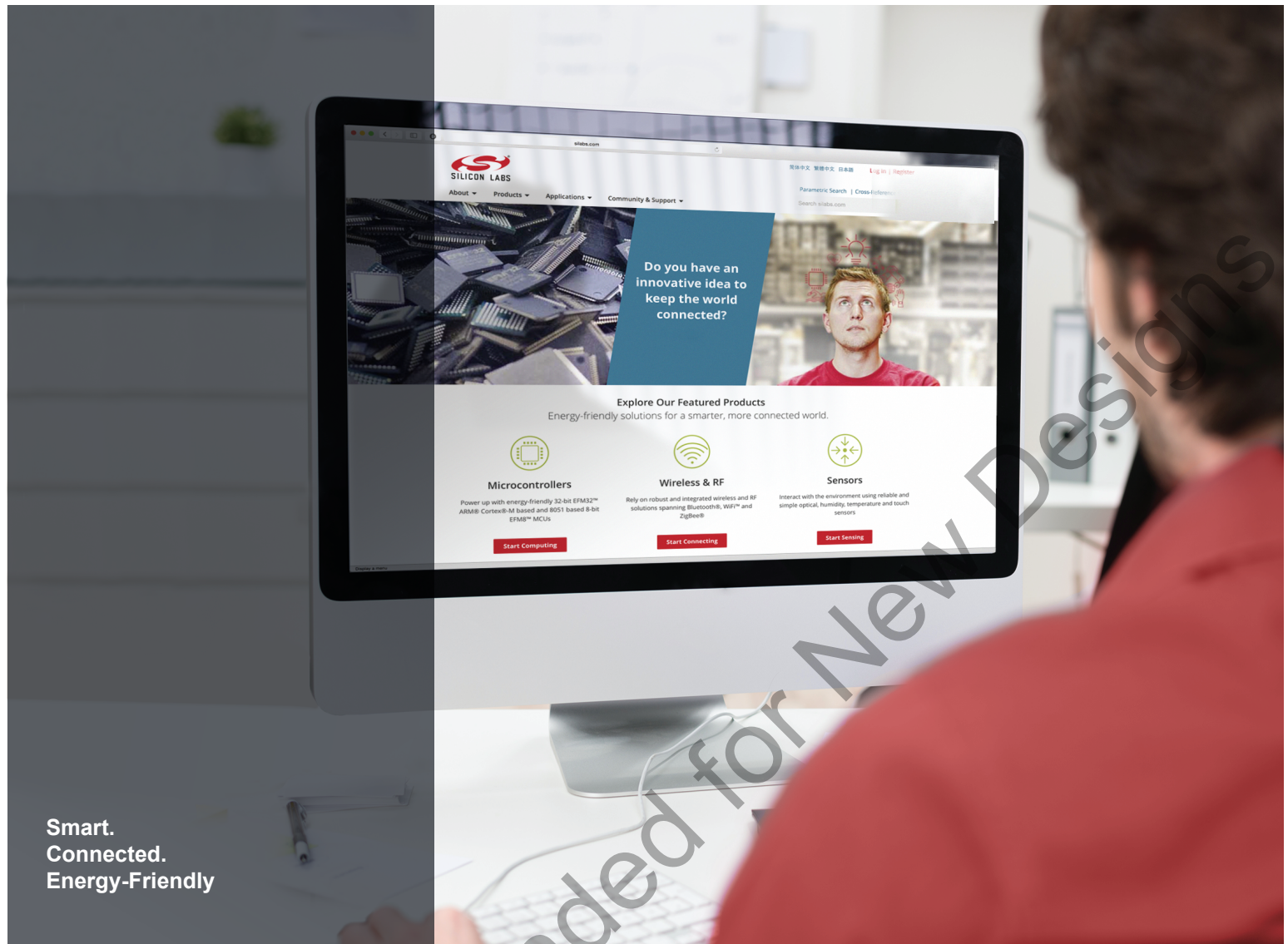
Table 1.1. Recommended Operating Conditions

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 ² C _{VIH}		V _{DD} × 0.7	—	V _{DD}	V
SCL, SDA Input Low Logic Voltage	I ² C _{VIL}		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	—	—	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} × 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

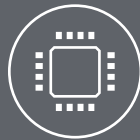
Part Number	Package	LED Drivers
Si1144-A10-GMR	2 mm x 2 mm DFN	3 LED drivers



Smart.
Connected.
Energy-Friendly



Products
www.silabs.com/products



Quality
www.silabs.com/quality



Support and Community
community.silabs.com

Disclaimer

Silicon Laboratories intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Laboratories products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications. Application examples described herein are for illustrative purposes only. Silicon Laboratories reserves the right to make changes without further notice and limitation to product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Silicon Laboratories shall have no liability for the consequences of use of the information supplied herein. This document does not imply or express copyright licenses granted hereunder to design or fabricate any integrated circuits. The products must not be used within any Life Support System without the specific written consent of Silicon Laboratories. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Laboratories products are generally not intended for military applications. Silicon Laboratories products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons.

Trademark Information

Silicon Laboratories Inc., Silicon Laboratories, Silicon Labs, SiLabs and the Silicon Labs logo, Bluegiga, CMEMS®, EFM, EFM32, EFR, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Ember®, EZLink®, EZMac®, EZRadio®, EZRadioPRO®, DSPLL®, ISOModem®, Precision32®, ProSLIC®, SiPHY®, Telegesis, USBXpress® and others are trademarks or registered trademarks of Silicon Laboratories Inc. ARM, CORTEX, Cortex-M3 and THUMB are trademarks or registered trademarks of ARM Holdings. Keil is a registered trademark of ARM Limited. All other products or brand names mentioned herein are trademarks of their respective holders.



Silicon Laboratories Inc.
400 West Cesar Chavez
Austin, TX 78701
USA

<http://www.silabs.com>