Sensors

Fully-calibrated, low-power intelligent sensing solutions

High precision optical sensor family senses UV Index, ambient light, long range proximity, heart rate/pulse oximetry and motion with 2D or 3D gestures.

**Si1132 Ultraviolet (UV) Index and Ambient Light Sensor**

The monolithic Si1132 sensor integrates multiple photodiodes, an analog-to-digital converter, a signal processor and a digital I2C control interface. This UV Index and ambient light sensor enables fitness wrist/arm bands, smart watches, and smartphones to measure UV sun exposure. Customers benefit by receiving a warning of when their current UV exposure is at an unhealthy level or to determine their cumulative UV exposure during exercise.

**Si114x Multi-LED Heart Rate, SpO2, Proximity and Ambient Light**

The monolithic Si114x sensors integrate high sensitivity photodiodes, a low-noise analog-to-digital converter, analog filtering, up to 3-LED drivers and a digital I2C control interface into one package. Broad spectral sensitivity supports green through 940nm LEDs for wrist, ear, and finger-tip heart rate/SpO2 signals. This low-power sensing family enables long battery life with standby less than 500 nA and a short 25.6µs LED on time.

**IDEAL FOR WEARABLE APPLICATIONS**

- Digital UV Index sensor enables real-time UV sun exposure and cumulative UV sun exposure
- Ambient light sensor with 0.1 to 128 kLux dynamic range operates in direct sunlight
- Long battery life with as little as 1.2 µA average current UV Index measurements, < 500 nA standby, and 1.7 V to 3.6 V operation
- I2C interface for ease of communication with host MCU
- Tiny 2 mm x 2 mm clear QFN package
- Operating temperature – 40 to 85 °C

**BIOMETRIC, PROXIMITY, AND AMBIENT LIGHT SENSING**

- Accurately sense weak blood flow signals
- Advanced signal processing to extract heart rate information
- Broad spectral sensitivity supports green through 940nm LEDs
- Dynamically drive 1, 2, or 3 LEDs
- Long battery life
- I2C interface for ease of communication with host MCU
- Tiny 2 mm x 2 mm clear QFN package
It’s not only about connecting devices. It’s about improving our way of life. The way we do business, and the impact we have on our environment. It’s called the Internet of Things, and it’s going to change everything.

Full system-level solutions
In addition to highly integrated sensor products, Silicon Labs offers software and source code for a variety of applications, along with full hardware and software reference designs.

Easy design-in and production ramp
All of Silicon Labs’ sensor products are compatible with SMT pick-and-place and reflow assembly processes. The full factory calibration and minimal amount of external bill of materials keeps costs low.

High performance and flexibility
High performance sensor elements, combined with patented analog front end circuit design enables high sensitivity and wide accuracy ranges. Multiple package options provide flexibility depending on the application requirements.
Energy-friendly relative humidity sensor family offers flexibility to meet the needs of almost any application.

**Si700x/1x/2x Relative Humidity and Temperature Sensors**

Silicon Labs’ state of the art relative humidity and temperature sensors utilize proven techniques for measuring humidity using polymer dielectric film along with CMOS mixed signal integrated circuits. These monolithic ICs combine fully calibrated humidity and temperature sensing elements along with on-chip signal conditioning into a compact, rugged and reliable package.

**FEATURES**

- Three RH accuracy levels up to ± 3% RH (maximum) @ 0 to 80% RH
- Two temperature accuracy levels up to ±0.4 °C (maximum) @ -10 to +85 °C
- I²C or PWM outputs
- As low as 2.2 μW average power at 3.3 V and 1 sample per second
- Optional factory-installed filter/cover offers lifetime protection of the sensor
- Optional auxiliary 2nd zone sensor input
- Industry standard package footprint

**Si705x Temperature Sensors**

Silicon Labs’ digital temperature sensors feature innovative signal processing and mixed-signal designs that deliver high accuracy and industry-leading low power consumption. All of these devices are factory calibrated and maintain their accuracy across the entire operating voltage and temperature ranges. The integrated analog to digital converters support up to 14-bit resolution for applications demanding high-precision.

**FEATURES**

- Four temperature accuracy levels from ±0.3 °C to ±1.0 °C (maximum)
- Accuracy maintained over the entire operating temperature and voltage range
- −40 to +125 °C and 1.9 to 3.6V operating ranges
- As low as 195 nA average current @ 1 Hz sample rate
- 14-bit resolution
- I²C interface
### OPTICAL SENSORS WITH UV INDEX

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Description</th>
<th>LED Drivers</th>
<th>Heart Rate Monitor</th>
<th>Gesture/ Motion Sensing</th>
<th>ALS</th>
<th>Interface</th>
<th>Evaluation Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si1132-A10-GMR</td>
<td>2x2 mm QFN-10</td>
<td>AEC-Q100 Proximity/ALS</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>I²C</td>
<td>UVrSlider2EK</td>
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<tr>
<td>Si1147-A10-GMR</td>
<td>2x2 mm QFN-10</td>
<td>AEC-Q100 Proximity/ALS</td>
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<td>✓</td>
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<td>I²C</td>
<td>UVrSlider2EK</td>
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<td>Si1146-A10-GMR</td>
<td>2x2 mm QFN-10</td>
<td>AEC-Q100 Proximity/ALS</td>
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<td>✓</td>
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<td>I²C</td>
<td>UVrSlider2EK</td>
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<tr>
<td>Si1145-A10-GMR</td>
<td>2x2 mm QFN-10</td>
<td>Proximity/ALS</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>I²C</td>
<td>UVrSlider2EK</td>
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### OPTICAL SENSORS WITHOUT UV INDEX

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Description</th>
<th>LED Drivers</th>
<th>Heart Rate Monitor</th>
<th>Gesture/ Motion Sensing</th>
<th>ALS</th>
<th>Interface</th>
<th>Evaluation Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si1143-A11-YM0R</td>
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<td>Si1140DK, IRMFB-EK</td>
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<tr>
<td>Si1142-A11-YM0R</td>
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<td>AEC-Q100 UV/Proximity/ALS</td>
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<td>✓</td>
<td>✓</td>
<td>I²C</td>
<td>Si1140DK, IRMFB-EK</td>
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<tr>
<td>Si1141-A11-YM0R</td>
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<td>AEC-Q100 UV/Proximity/ALS</td>
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<td>✓</td>
<td>✓</td>
<td>I²C</td>
<td>Si1140DK, IRMFB-EK</td>
</tr>
<tr>
<td>Si1143-A11-GMR</td>
<td>2x2 mm QFN-10</td>
<td>UV/Proximity/ALS</td>
<td>3</td>
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<td>✓</td>
<td>✓</td>
<td>I²C</td>
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<tr>
<td>Si1142-A11-GMR</td>
<td>2x2 mm QFN-10</td>
<td>Proximity/ALS</td>
<td>2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>I²C</td>
<td>Si1140DK, IRMFB-EK</td>
</tr>
<tr>
<td>Si1141-A11-GMR</td>
<td>2x2 mm QFN-10</td>
<td>Proximity/ALS</td>
<td>1</td>
<td>✓</td>
<td>✓</td>
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<td>Si1140DK, IRMFB-EK</td>
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<tr>
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<td>Optical proximity detector</td>
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<td>Digital (On/ Off)</td>
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### RELATIVE HUMIDITY AND TEMPERATURE SENSORS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Accuracy (Max)</th>
<th>Output</th>
<th>Protective Cover Option</th>
<th>AEC-Q100 UV/Proximity/ALS</th>
<th>Standard Footprint / Drop-in Replacement</th>
<th>Evaluation Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si7023-A20</td>
<td>3x3mm, DFN-6</td>
<td>±3%RH / 0.4°C</td>
<td>PWM</td>
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<td>✓</td>
<td>✓</td>
<td>Si7022-23-EVB</td>
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<tr>
<td>Si7021-A20</td>
<td>3x3mm, DFN-6</td>
<td>±3%RH / 0.4°C</td>
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<td>✓</td>
<td>✓</td>
<td>Si7013USB-DONGLE</td>
</tr>
<tr>
<td>Si7013-A20</td>
<td>3x3mm, DFN-10</td>
<td>±3%RH / 0.4°C</td>
<td>I²C</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Si7013USB-DONGLE</td>
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<tr>
<td>Si7022-A20</td>
<td>3x3mm, DFN-6</td>
<td>±4%RH / 0.4°C</td>
<td>PWM</td>
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<td>Si7022-23-EVB</td>
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<tr>
<td>Si7020-A20</td>
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<td>±4%RH / 0.4°C</td>
<td>I²C</td>
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<td>Si7013USB-DONGLE</td>
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<tr>
<td>Si7007-A20</td>
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<td>±5%RH / 1.0°C</td>
<td>PWM</td>
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<tr>
<td>Si7006-A20</td>
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<td>±5%RH / 1.0°C</td>
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<td>✓</td>
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<td>Si7006-07-EVB</td>
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### TEMPERATURE SENSORS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Accuracy (Max)</th>
<th>Output</th>
<th>Protective Cover Option</th>
<th>AEC-Q100 UV/Proximity/ALS</th>
<th>Standard Footprint / Drop-in Replacement</th>
<th>Evaluation Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si7053-A20</td>
<td>3x3mm, DFN-6</td>
<td>±0.3°C</td>
<td>I²C</td>
<td>✓</td>
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<td>-</td>
<td>Si7053-EVB</td>
</tr>
<tr>
<td>Si7054-A20</td>
<td>3x3mm, DFN-6</td>
<td>±0.4°C</td>
<td>I²C</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>Si7054-EVB</td>
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<tr>
<td>Si7055-A20</td>
<td>3x3mm, DFN-6</td>
<td>±0.5°C</td>
<td>I²C</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>Si7055-EVB</td>
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<tr>
<td>Si7050-A20</td>
<td>3x3mm, DFN-6</td>
<td>±1.0°C</td>
<td>I²C</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>Si7050-EVB</td>
</tr>
</tbody>
</table>

*Note: Includes 2-zone temperature sensor

### Silicon Labs’ Sensor Development Tools

**SLSTK3201A**

This kit contains both the EFM32™ Zero Gecko STK and sensor expansion board, which contains Silicon Labs’ Si7013 Relative Humidity and Temperature Sensor, Si1147 Si1147 HRM/SpO2/Proximity/UV/Ambient Light Sensor.

**SENSOR-PUCK**

The SENSOR-PUCK provides a convenient environmental and biometric sensor evaluation tool using Silicon Labs’ Si114x Optical Sensors and Si701x/2x Relative Humidity and Temperature Sensors.

**BIOMETRIC-EXP**

The BIOMETRIC-EXP-EVB card provides a convenient development and demo platform for Silicon Labs’ Si114x heart rate/SpO2/UV sensor and Si701x/2x Relative Humidity and Temperature Sensors.

Silicon Labs’ design resources allow for quick and easy development and demos.

The SENSOR-PUCK is an easy to demonstrate, small, low-power, sensor IoT system that uses Bluetooth low energy to broadcast environmental and biometric sensor measurements to smartphones using Silicon Labs iPhone or Android apps.

www.silabs.com/sensor-puck

HRM Development Kit
This $49.99 kit is an excellent starting point for developing wearables with Silicon Labs

Online Utilities
Use IR Range Estimator, Sensor Current Estimator, plus Cross-Reference search tools to streamline development

Need Help
Ask questions and contact our experts directly in the support portal.
www.silabs.com/support

Silicon Labs Community
Find the support and answers you need on Silicon Labs community forum.
community.silabs.com

Find your nearest distributor, or buy or sample online, see details at www.silabs.com/sensors