Digital RGB + IR / Ambient Light, Proximity, Pulse Oximeter and Heart-Rate Sensor

OB1203
Preliminary
Short-Form Datasheet

Description

IDT's OB1203 Sensor Module integrates a multi-channel light sensor (LS/CS), a proximity sensor (PS), and a photoplethysmography sensor (PPG).

The light sensor can be configured as an ambient light sensor (LS) to measure ambient light similar to the human eye experience or as an RGB color sensor (CS). The module has a fully integrated biosensor for reflective photoplethysmography. With the appropriate algorithm, it can determine the human heart rate, oxygen saturation (SpO_2), respiration rate, and heart rate variability (a measure of stress). The OB1203 integrates light sources and drivers in a single optically optimized package.

A major LS application for the device is in smart phones or other mobile devices to enable brightness control of display panels. The OB1203 can also determine proximity of nearby objects in order to support the activation of touch screen displays or system functions. The sensor combines optical sensing features (CS, LS, PS) and bio-sensing functionality (PPG) without needing a visible optical opening. The unique implementation of the OB1203 enables SpO_2 measurements behind ink that is IR transmissive, but visibly dark, allowing for aesthetic industrial designs.

Biosensor Features

- SpO_2 measurement behind visibly dark, IR-transmissive ink
- Industry's smallest optical biosensor module
- Fully integrated and trimmed module, including two LEDs, 250mA maximum drive current, and photodetectors
- Output resolution of PPG: 16 to 18 bits
- Data stored in 18-bit-wide, 32-sample FIFO memory
- Integrated averaging function for higher signal-to-noise ratio (SNR) and data rate reduction
- Programmable measurement rate: up to 3200 samples per second
- High SNR

Ambient Light Sensor Features

- High lux accuracy over different light sources.
- Absolute sensitivity: 0.06 lx to >150,000 lx
- Output resolution LS: 13 to 20 bits
- Three LS gain modes: x1 to x6
- Highly linear output, 50Hz/60Hz light and fluorescent light flicker immunity

Color Sensor Features

- Four parallel channels (red, green, blue, clear)
- Accurate correlated color temperature (CCT)
- Accurate CIE 1931 XYZ (RGB) color measurement
- Very stable spectral response over angle of light incidence
- Output resolution for CS: 13 to 20 bits

Proximity Sensor Features

- Integrated and trimmed LED source, driver, and photodetector
- Programmable, pulsed LED up to 250mA output current
- High resolution (12 to 16 bits)
- Object movement detection (in/out)
- Ambient light suppression > 100 klx sunlight
- Crosstalk cancelation (analog and digital)

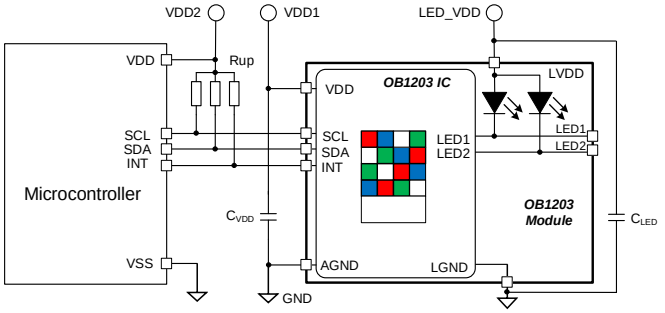
Physical Characteristics

- Highly reliable and industry-proven OSIP package with integrated cover glass for hypoallergenic products
- Wide operation temperature range: -40°C to +85°C
- Wide supply voltage range: 1.7V to 3.6V
- Typical active current at minimum duty cycle:
  - LS/CS: 110µA
  - PS: 90µA + LED current (typical: ~300µA average)
- Low standby current: 2µA typical
- I2C interface capable of Standard Mode (100kHz) or Fast Mode (400kHz) communication; 1.8V to 3.3V logic compatible
- Programmable level-based interrupt functions with upper and lower thresholds for extending battery life
- Industry's smallest package: $4.2 \times 2 \times 1.2$ mm³ 14-pin module

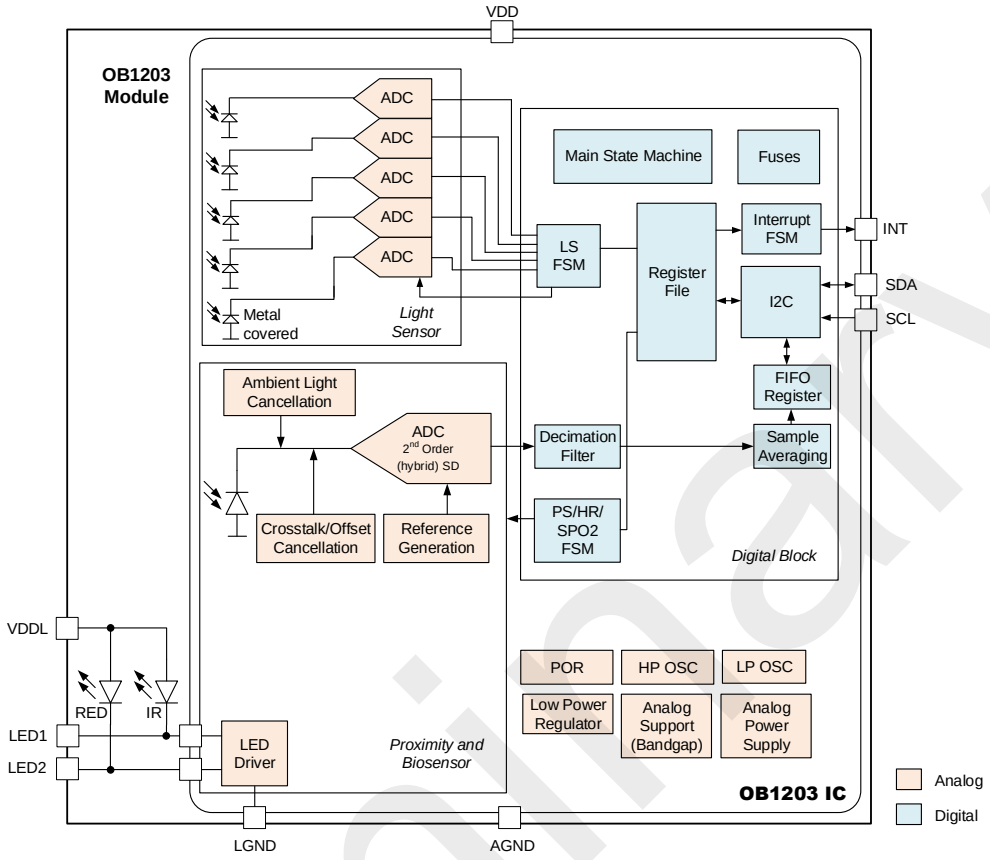
Typical Applications

- Mobile Devices: Wearables, Fitness and Accessories
- Industrial: Lighting, Proximity, Worker Safety, Driver Assist

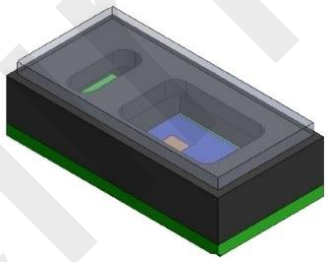
Application Circuit



Block Diagram



Ultra-compact Form Factor Optical Package: 4.2 × 2 × 1.2 mm³



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