RENESAS

BIG IDEAS FOR EVERY SPACE

OB1203

ALL-IN-ONE BIO AND LIGHT SENSOR

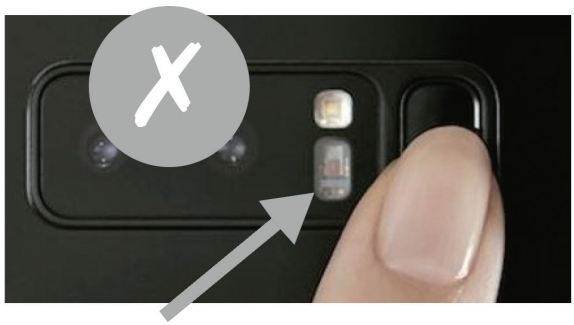
Overview

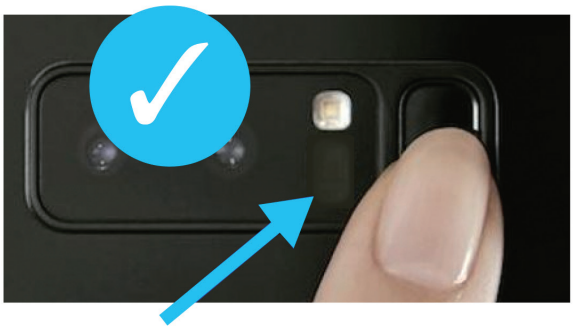
The OB1203 sensor module integrates a multi-channel light sensor (LS/CS), a proximity sensor (PS), and a photoplethysmography sensor (PPG).

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 human heart rate (HR), oxygen saturation (SpO2), 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 of 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 SpO2 measurements behind ink that is IR transmissive, but visibly dark, allowing implementation in aesthetic industrial designs.

The OB1203 is the only biosensor on the market that works behind IR Ink





OB1203 ALL-IN-ONE BIO AND LIGHT SENSOR

Benefits

- Works with IR-Ink (virtually invisible)
- Internal driver can connect to external LEDs
- No external components required
- Fully factory calibrated
- Direct skin contact
- Very thin form factor

Applications

Fitness, Wellness, Automotive, Medical Applications

- Fitness Trackers
- Smartphone cases with an integrated biosensor
- Athletic garments
- Worker safety
- Mobile or tabletop Pulse Oximetry devices
- Automotive
- Driver assist, stress management

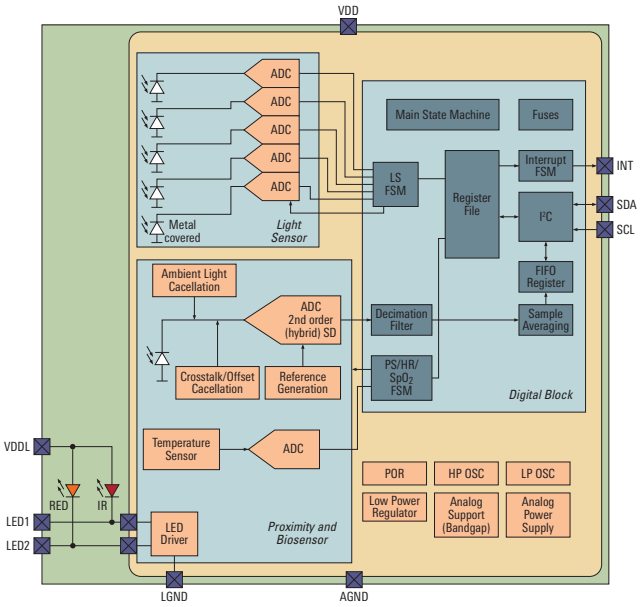
Features

- Fully integrated module:
  - Bio sensing*
    - Heart Rate, SpO2
    - Heart Rate Variability (Stress)
    - Respiration Rate
    - Reflective PPG
  - Color, Light, and Proximity
- Smallest from factor 4.2 × 2 × 1.2mm
- Complete solution - PulsOx algorithm
- Reliable and hypoallergenic glass lid

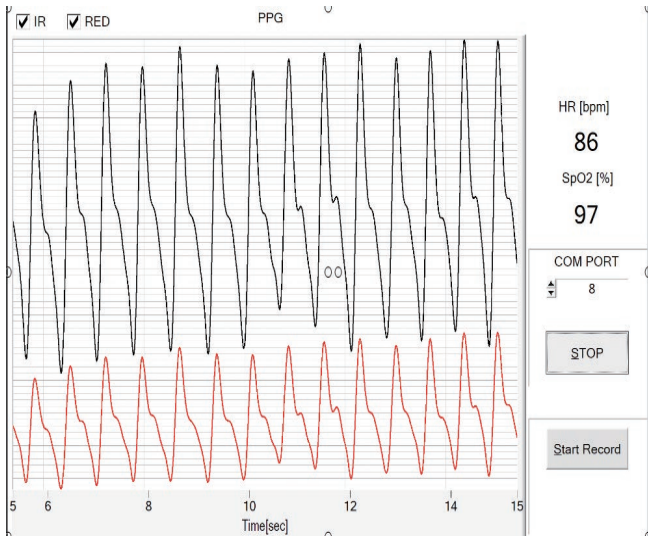
* HR & SpO2 algorithm included

Differentiation

- Only fully integrated module (ALS, Prox, RGB, SpO2, HR)
- Only biosensor that works invisibly behind IR-Ink
- Smallest package
- Complete with algorithm and Android APK
- Clinical grade calibration



OB1203 Block Diagram



Typical PPG Waveform

Biosensor Features

- SpO2 measurement behind visibly dark, IR transmissive ink
- Industry's smallest optical biosensor module
- Fully integrated and trimmed module, including two LEDs, 250 mA maximum drive current, and photodetectors
- Output resolution 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

Benefits

- High lux accuracy over different light sources
- Absolute sensitivity: 0.06 lux to > 150000 lux
- Output resolution LS/CS: 13 to 20 bits
- Three LS/CS gain modes: ×1 to ×6
- Highly linear output, 50 Hz/60 Hz 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 CS: 13 to 20 bits

Proximity Sensor Features

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

Physical Characteristics

- Highly reliable and industry-proven OSIP package with integrated cover glass for hypoallergenic products
- Wide operation temperature: - 40°C to +85°C
- Wide supply voltage: 1.7 V to 3.6 V
- Typical active current at minimum duty cycle:
  - LS/CS: 110 µA
  - PS: 90 µA + LED current (typical ~300 µA average)
- Low standby current: 2 µA typical
- I^2C interface capable of Standard Mode (100 kHz) or Fast Mode (400 kHz) communication; 1.8 V to 3.3 V logic compatible
- Programmable level-based interrupt functions with upper and lower thresholds for extending battery life
- Industry's smallest package: 4.2 × 2 × 1.2 mm^3 14-OSIP module

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COMPETITOR COMPARISON

Device / Parameter	Renesas OB1203	Competitor #1 (Product #1)	Competitor #1 (Product #2)	Competitor #1 (Product #3)	Competitor #1 (Product #4)	Competitor #2 (Product #1)	Competitor #2 (Product #2)	Competitor #3
Derivatives								
BIO/PPG	×	–	–	–	–	–	–	
ALS	×	×	×	×	×	×	×	×
RGB	×	×	×	×		×	–	×
White/Clear	×	×	×	×	×	×	×	×
PS	×	×	×	–	×	–	×	×
ALS Res	20	16	16	16	16	16	16	16
PS Res/Bio	18/18	14/NA	8/NA	–	8/NA	–	12/NA	–
VDD	1.7~3.6	2.7~3.6	1.7~2.0	2.7~3.6	1.7~2.0	2.3~3.6	2.5~3.6	2.5~3.6
VIO	1.7~3.6	1.8	1.8	1.8/VDD	1.8	1.8~3.6	1.8~3.6	1.7~3.6
IDD active	110µA	150µA	90µA	235µA	80µA	130µA	90µA	200µA
IDD standby	<2µA	<1µA	<1µA	1µA	<1µA	<1µA	1µA	<1µA
Temp (°C)	-40~85	-30~85	-30~85	-40~70	-30~85	-40~85	-25~85	-40~85
Lux Range	8m~157k	20m~120k	200m~60k			5m~40k		8m~16.5k
Dark count	1~2	1~3	1~3	1~4	1~3	0~3	0~5	0~3
Package	OSIP14	DFN8	OLGA8	DFN6	OLGA8	WSON8		OLGA8
Package Size	4.2 × 2 × 1.2	5 × 2 × 1	4 × 1.75 × 1 3.65 × 2 × 1	2.4 × 2 × 0.65	3.65 × 2 × 1	2.1 × 2 × 0.6	4 × 2.4 × 1.35	5.6 × 2.8 × 1.2 - 36653 4 × 2 × 1.1 - 36671

	Competitor	Renesas OB1203
Package Dimensions	3.3mm × 5.6mm (18.5mm2) × 1.55mm height (28.6mm3)	2.0 mm × 4.2 mm (8.4 mm2) × 1.2 mm height (10mm3) 3× smaller volume
Package Type	Glass lid OSIP	Glass lid OSIP
Ambient Light sensing	n/a	RGB, IR
Proximity sensing	HRM pilot mode only	True proximity sensor: micro-pulse averaging for ambient rejection
Internal averaging	1-32 samples	1-32 samples
Max sample rate	3200 sps	3200/3840 sps in 50/60Hz mode for better flicker rejection
Max LED Drive current	50mA	250mA
LED Drive Current resolution	8 bit, FS range only	8 bit, 3 ranges (forward compatible to VCSELs)
SNR (dB)	Low 80's	Low 80's
Front end (crosstalk) current cancellation	n/a	1.5× full-scale crosstalk subtraction
Ambient light cancellation	Yes	Yes

For more details, please visit **idt.com/ob1203**

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