

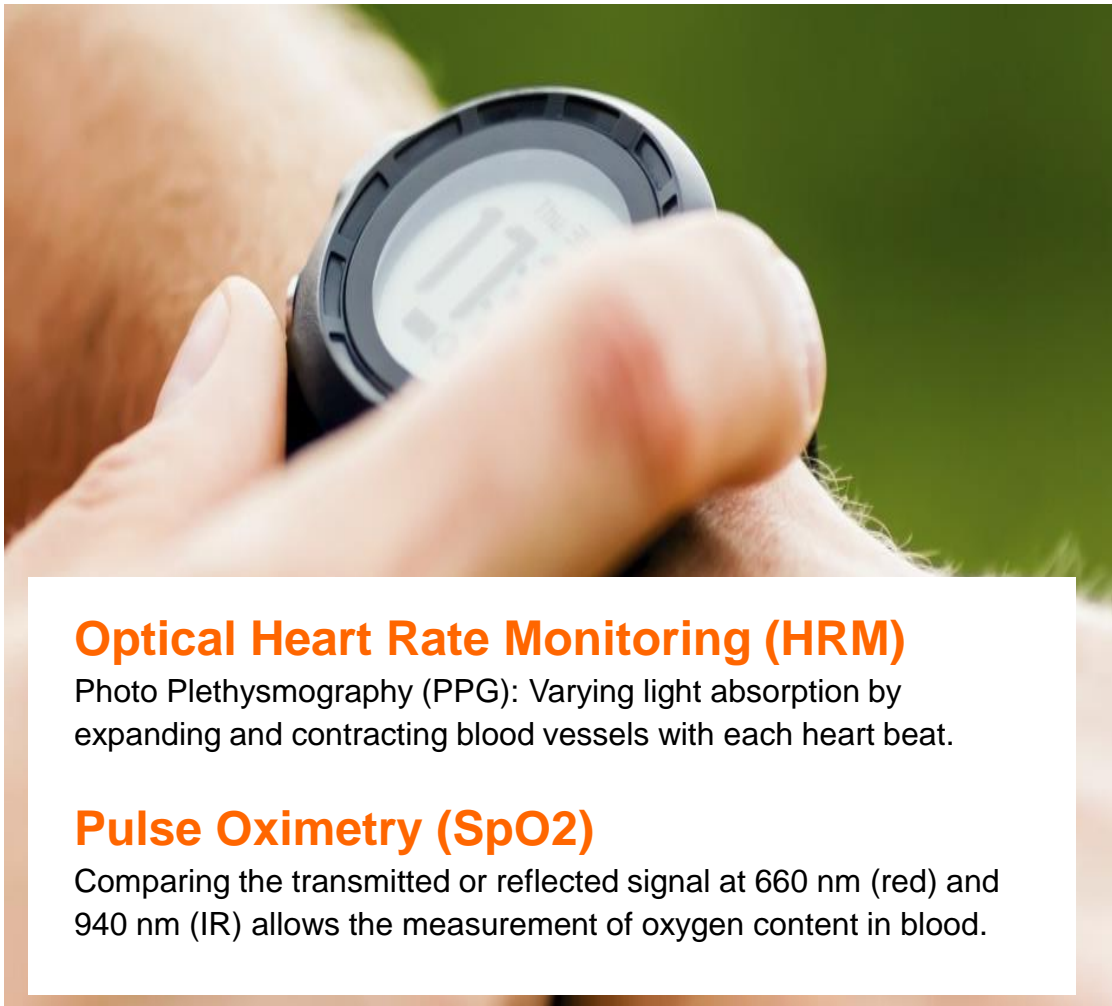


Heart Rate and Pulse Oximetry

OS ELS | May 2018
Light is OSRAM

OSRAM
Opto Semiconductors

Optical Solutions for Bio-Sensing in Wearables and Medical Devices

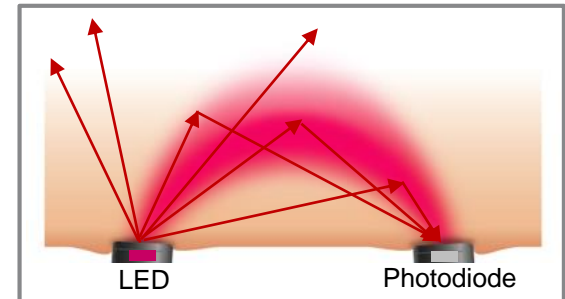


Optical Heart Rate Monitoring (HRM)

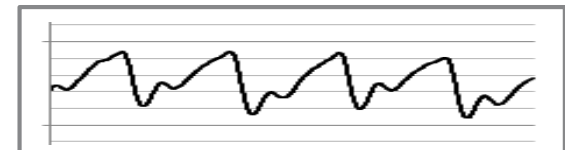
Photo Plethysmography (PPG): Varying light absorption by expanding and contracting blood vessels with each heart beat.

Pulse Oximetry (SpO2)

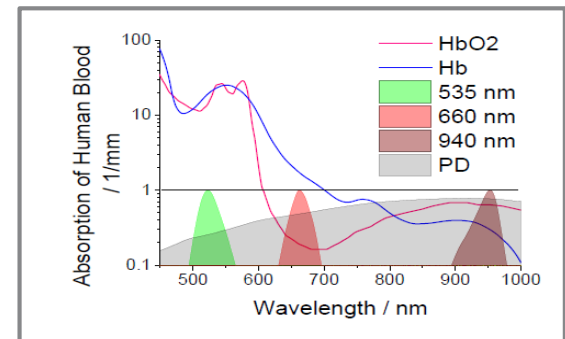
Comparing the transmitted or reflected signal at 660 nm (red) and 940 nm (IR) allows the measurement of oxygen content in blood.



Reflective measurement



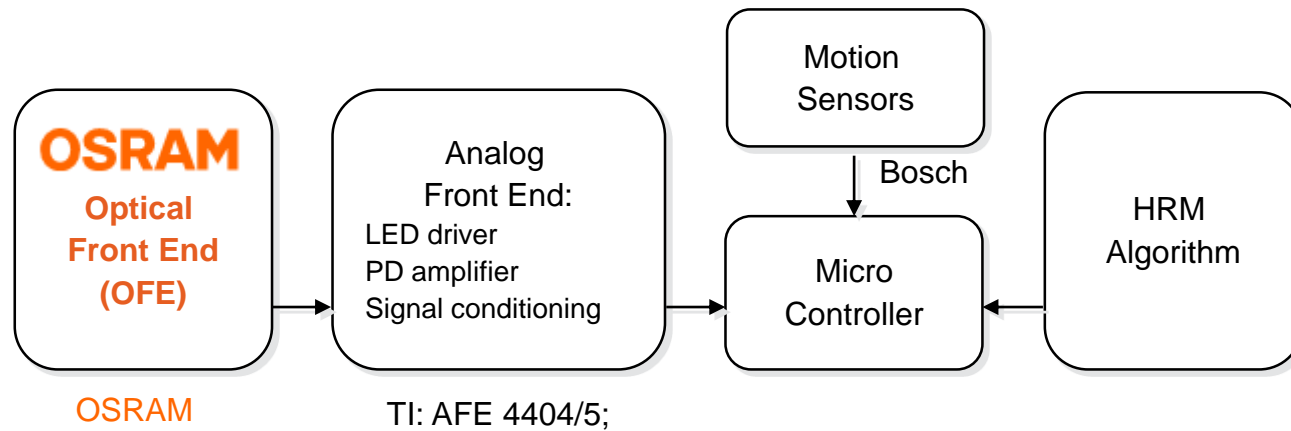
HRM Signal



Pulse Oximetry

OSRAM is the partner of choice for the Optical Front End (lights and sensors)

Building Blocks



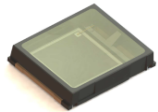
Recommended products – Optical Sensor Frontend

Discrete solution



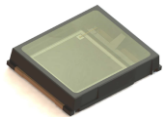
HRM:

1. Green LED
 - e.g. LT PWSG
2. Large-area photodiode with IR filter
 - e.g. SFH 2240

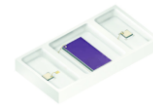


Pulse Oximetry:

1. Red LED
 - e.g. CH DELSS1.22
2. IRED
 - e.g. SFH 4441
3. Broad-band photodiode
 - e.g. SFH 2200



Integrated solution BIOFY®



HRM:

BIOFY®

Includes

1. Green LED
2. Photodiode

- e.g. SFH 7070



Pulse Oximetry + HRM

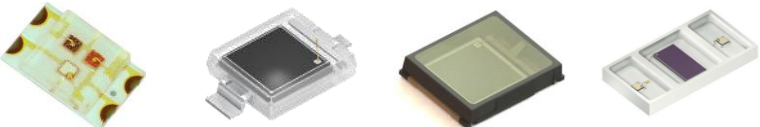
BIOFY®

Includes

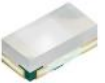







1. Red LED
2. IRED
3. Broad-band photodiode
4. Green LED
5. IR cut photodiode

- e.g. SFH 7072



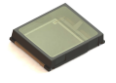
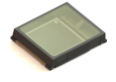
Recommended products – Benefits and more

Customer Benefit	Decision criteria	Tools
<p>Discrete Components (emitter + photo diode)</p> <ul style="list-style-type: none">– Highly efficient Thinfilm emitters using the newest UX:3 technology– Fast, sensitive photo diode with high linearity and large sensitive area– Integrated optical filters on photo diode to improve signal quality <p>BIOFY® Sensor</p> <ul style="list-style-type: none">– Integrated optical frontend with compact dimensions– Optical barrier to ensure good signal to noise ratio– Options with IR/Red emitters for SpO2 measurement based on Pulse Oximetry <div data-bbox="144 1053 908 1178"></div> <p>CHIPLED DIL TOPLED D5140 BIOFY®</p>	<p>→ Discrete components for highest flexibility to optimize performance by the optical design and specific components</p> <p>→ BIOFY® sensor as a ready optical solution with compact size and good signal quality</p>	<p>Application notes:</p> <ul style="list-style-type: none">• SFH 7050- Photoplethysmography (PPG) Sensor• BIOFY Opto-Mechanical Integration <p>Reference design</p> <ul style="list-style-type: none">• (TI AFE 4404): All OSRAM BIOFY® sensors available as auxiliary board solution• Mediatek AFE MT2511: SFH7070 inside MT2523+MT2511 HRM+BP total solution as sub board. <p>Spotlight:</p> <ul style="list-style-type: none">• High signal quality for reliable measurements





Products at a glance -- Discretes (Green/Red/Infrared LEDs)

Device	Part number	Centroid wavelength (nm)	Forward voltage (V @ 20 mA)	Total optical flux (mW) @ 20 mA	Radiant sensitive Area (mm ²)	Capacitance (pF)	Spectral Range (nm)	Dimensions (mm ³)	
ChipLED (0402)	LT QH9G	530	2.85	200 ... 600 mcd				0.4 x 0.6 x 0.4	
ChipLED (0603)	LT Q39G	530	2.85	200 ... 600 mcd				0.8 x 1.6 x 0.4	
Firefly	CT DELSS1.12	530	3.2	1120 ... 2240 mcd				0.8 x 1.6 x 0.6	
Firefly	CH DELSS1.22	643	2	180 ... 450 mcd				0.8 x 1.6 x 0.6	
PointLED	LT PW5G	525	3.2	1800 ... 2800 mcd				1.9 x 3.5 x 0.88	
Mini MIDLED	SFH 4441	940	1.3	10				2.3 x 1.95 x 0.9	
CHIPLED (0402)	SFH 4043	940	1.3	10				1.0 X 0.5 x 0.45	
Triple color ChipLED	SFH 7013	530 / 655 / 940	3.0 / 2.1 / 1.3	11/12/10				2.5 X 1.6 x 0.55	

Products at a glance – Discretes (Photodiodes)

Device	Part number	Centroid wavelength (nm)	Forward voltage (V @ 20 mA)	Total optical flux (mW) @ 20 mA	Radiant sensitive Area (mm ²)	Capacitance (pF)	Spectral Range (nm)	Dimensions (mm ³)	
SMT DIL	BPW 34S				2.65 x 2.65	72	400 ... 1100	6.5 x 3.9 x 1.15	
SMT DIL	SFH 2440				2.65 x 2.65	135	400 ... 690 (IR Filter)	6.5 x 3.9 x 1.15	
TOPLED® D5140	SFH 2200				2.65 x 2.65	60	300 ... 1100	5.1 x 4.0 x 0.85	
TOPLED® D5140	SFH 2240				2.65 x 2.65	135	400 ... 900 (IR Filter)	5.1 x 4.0 x 0.85	

Products at a glance -- Integrates (BIOFY)

Device	Part number	Centroid wavelength (nm)	Forward voltage (V @ 20 mA)	Total optical flux (mW) @ 20 mA	Radiant sensitive Area (mm ²)	Capacitance (pF)	Spectral Range (nm)	Dimensions (mm ³)	
BIOFY®	SFH 7050 NFND	530 / 655 / 940	3.4 / 2.1 / 1.3	2.9 / 6.4 / 5.3	1.4 x 1.4	5	400 – 1100	4.7 x 2.5 x 0.9	
BIOFY®	SFH 7051 NFND	535	3.2	3 * 3.4	1.4 x 1.4	5	400 – 1100	4.7 x 2.5 x 0.9	
BIOFY®	SFH 7060	535 / 655 / 940	3.4 / 2.1 / 1.3	3 * 3.4 / 6.4 / 5.3	1.4 x 1.4	5	400 – 1100	7.2 x 2.5 x 0.9	
BIOFY®	SFH 7070	530	3.0	2 * 11.7	1.29 x 2.69	55	402 ... 694 (IR Filter)	7.5 x 3.9 x 0.9	
BIOFY®	SFH 7072	530 / 655 / 940	3.0 / 2.1 / 1.3	11 / 14 / 11	0.89 x 0.89 + 1.29 x 2.69	4.2 + 55	410 ... 1100 + 402 ... 694 (IR Filter)	7.5 x 3.9 x 0.9	