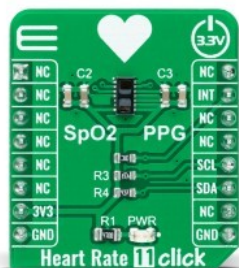


Heart Rate 11 Click



PID: MIKROE-5170

Heart Rate 11 Click is a compact add-on board suitable for heart rate monitoring applications. This board features the [OB1203](#), a multi-channel light sensor (LS/CS), a proximity sensor (PS), and a photoplethysmography sensor (PPG) from [Renesas](#). It can be configured as an ambient light sensor to measure ambient light similar to the human eye experience or as an RGB color sensor. The OB1203 establishes communication to and from the module entirely through a standard I2C compatible interface and has a fully integrated biosensor for reflective photoplethysmography. With the appropriate algorithm, this Click board™ can determine human heart rate (HR), oxygen saturation (SpO2), respiration rate, and heart rate variability (a measure of stress).

Heart Rate 11 Click is supported by a [mikroSDK](#) compliant library, which includes functions that simplify software development. This [Click board™](#) comes as a fully tested product, ready to be used on a system equipped with the [mikroBUS™](#) socket.

How does it work?

Heart Rate 11 Click as its foundation uses the OB1203, a fully integrated all-in-one biosensor module that measures heart rate and blood oxygen levels from Renesas. The OB1203 combines all light sources, drivers, and sensor elements, in a single optically optimized package and can be used with just one side of a user's finger because it uses the space-conserving reflective PPG method. The appropriate algorithm can determine human heart rate, respiration rate, and heart rate variability (a measure of stress) or blood oxygen saturation (SpO2) behind IR transmissive but visibly dark ink, allowing implementation in aesthetic industrial designs.

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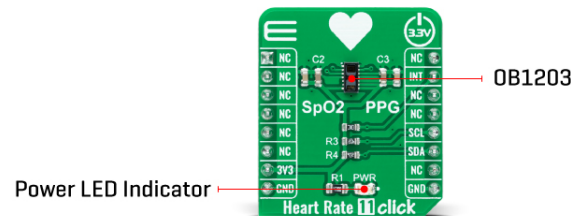
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The biosensor module contains different photodiodes for light (R, G, B, and Clear channels), proximity measurements, photoplethysmography, and temperature compensation of the light sensor. Those diodes are arranged in a matrix array, while the single diode for PS/PPG measurement is located below the matrix. The current photodiode is then converted to digital values by an analog-to-digital converter (ADC) and then forwarded via a serial interface for further processing.

The OB1203 communicates with MCU using the standard I2C 2-Wire interface with a maximum clock frequency of 400kHz, fully adjustable through software registers. Also, it uses an interrupt pin, the INT pin of the mikroBUS™ socket, indicating when a specific interrupt event occurs, such as light, proximity, or photoplethysmography threshold crossed.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Biometrics, Heart Rate
Applications	This Click board™ can determine human heart rate (HR), oxygen saturation (SpO2), respiration rate, and heart rate variability (a measure of stress)
On-board modules	OB1203 - fully integrated all-in-one biosensor module that measures heart rate and blood oxygen levels from Renesas
Key Features	SpO2 measurement behind IR transmissive but visibly dark ink, high illuminance accuracy across various light sources, high sensitivity and resolution, low power consumption, object movement detection, and more
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™

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Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Heart Rate 11 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	INT	Interrupt
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	SCL	I2C Clock
	NC	6	MOSI	SDA	11	SDA	I2C Data
Power Supply	3.3V	7	3.3V	5V	10	NC	
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator

Heart Rate 11 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
PSpectral Response (R/G/B/C)	610/550/470/520			nm
PPG Resolution	16	-	18	bits
AL Sensitivity	0.06	-	150.000	lux
AL&CS Resolution	13	-	20	bits
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Heart Rate 11 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Library Description

This library contains API for Heart Rate 11 Click driver.

Key functions

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- `heartrate11_get_int_pin` This function returns the INT pin logic state.
- `heartrate11_set_led_current` This function sets the maximal current of the selected LED.
- `heartrate11_read_fifo` This function reads a 24-bit data from the FIFO.

Example Description

This example demonstrates the use of Heart Rate 11 Click board™ by reading and displaying the PPG1 (HR) values which can be visualized on the SerialPlot application.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.HeartRate11

Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MikroElektronika [compilers](#).

mikroSDK

This Click board™ is supported with [mikroSDK](#) - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the [LibStock](#) and installed for the compiler you are using.

For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[Heart Rate 11 click example on Libstock](#)

[OB1203 datasheet](#)

[Heart Rate 11 click 2D and 3D files](#)

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[Heart Rate 11 click schematic](#)

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