

ECG 6 Click



PID: MIKROE-4061

ECG 6 Click is a complete solution for the development of ECG and Heart-Rate (HR) applications. It features the [MAX86150](#), a Reflective Heart Rate Monitor and Medical-Grade Pulse Oximeter from [Analog Devices](#). The Click board™ contain integrated electrocardiogram, pulse oximeter, heart rate monitor sensor module. The ECG 6 Click can be used for application in Fitness Assistant Devices, Wearable Devices, Smartphones, Tablet.

The ECG 6 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.

Note: ECG 6 Click is a development and prototyping tool. It is not intended to be used for medical treatment of patients, and should not be used to diagnose or treat any conditions.

How does it work?

The ECG 6 Click is based on the MAX86150, is a complete electrocardiogram (ECG) from Analog Devices. It is designed for mobile health. The Click board™ has many features to provide health measurements: electrocardiogram, pulse oximetry, and heart rate. All these features allow ECG 6 Click to be used in a range of health-related ECG, SpO2 subsystem and HR applications including fitness and activity heart rate monitors, portable ECG, wearable and remote health monitors, and similar.

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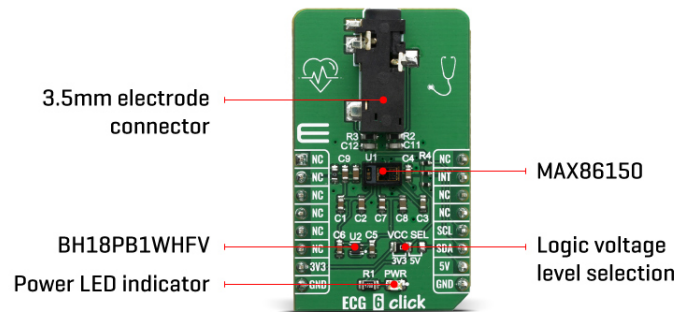
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The MAX86150 contains an integrated SpO2 subsystem. The SpO2 subsystem is peripheral capillary oxygen saturation. It is measured by a device called a pulse oximeter. A clip is placed on the finger or foot of the patient and light is sent through the finger and measured on the other side. The MAX86150 integrates red and infrared LED drivers to modulate LED pulses for SpO2 and HR measurements. The LED current can be programmed from 0mA to 100mA with proper VLED supply voltage. The LED pulse width can be programmed from 50µs to 400µs to optimize accuracy of results and power consumption based on use cases.

ECG 6 Click allows several types of electrodes to be used. It supports both stainless-steel and silver-chloride electrode types. The electrodes are used to perform differential measurement of the voltage generated by the heart. Therefore, the heart can be monitored from a single plane only - the coronal plane. However, this is quite enough for the fitness, heart rate monitoring and similar applications.

The extensive interrupt engine can be used to trigger the host MCU from various sources, including interrupt events due to lead detection, R-R detection, fast-recovery event, FIFO buffer states, and many more. These interrupt sources can be utilized to trigger a state change on the interrupt pin (INT) of the MAX86150 IC. This pin is active-low.

The voltage level of the logic section can be selected via VCC SEL jumper, between 3.3V and 5V. This allows for both 3.3V and 5V capable MCUs to use the SPI communication lines properly.

Specifications

Type	Biometrics, ECG
Applications	Medical health: Fitness Assistant Devices, Wearable Devices, Smartphones, Tablet,
On-board modules	MAX86150 electrocardiogram from Maxim Integrated.
Key Features	Reflective Heart Rate Monitor, Medical-Grade Pulse Oximeter,
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™

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Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on ECG 6 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 OUT
	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	5V	Power supply
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
JP1	VCC SEL	Left	Power supply voltage selection: left position 3.3V, right position 5V
LD1	PWR	-	Power LED indicator
CN1	3.5mm JACK	-	3.5mm electrodes connector

Software Support

We provide a library for the ECG 6 Click on our [LibStock](#) page, as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Library Description

The library provides the user with measurements from ECG sensors and PPG sensors. The user has full control of module settings and reads all registers via I2C communication.

Key functions:

- void ecg6_get_sample_data(ecg6_element_t *element, uint8_t num_sample) - Get one sample from FIFO
- uint8_t ecg6_ppg_default_config () - Default configuration for PPG sensor
- uint8_t ecg6_ecg_default_config () - Default configuration for ECG sensor

Examples description

The application is composed of three sections :

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- System Initialization - Initialize I2C module and all necessary pins
- Application Initialization - Checking communication accuracy and running default configuration for measurement
- Application Task - Measures an ECG signal or PPG sensor and draws a graph on a SerialPlot

Additional Functions :

- plot_ecg_data () - Sends ECG sensor data to SerialPlot
- plot_ppg_data () - Sends PPG sensor data to SerialPlot

Note: When using ECG measurement - PPG measurement must be switched off ... Drawing speeds vary for PPG and ECG sensor.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other MIKROE Libraries used in the example:

- I2C Librar
- Conversions Library
- String Library
- UART Library

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. The terminal available in all MIKROE [compilers](#), or any other terminal application of your choice, can be used to read the message.

mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE 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

[ECG 6 click 2D and 3D files](#)

[ECG 6 click example on Libstock](#)

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[MAX86150 datasheet](#)

[ECG 6 click schematic](#)

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