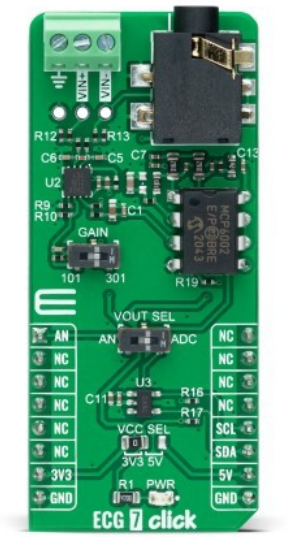
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

ECG 7 Click





PID: MIKROE-5214

ECG 7 Click is a compact add-on board that records the heart's electrical activity. This board features the MCP6N16, a single zero-drift instrumentation amplifier with selectable gain from Microchip. In addition to the jack connector provided for connecting the cable with ECG electrodes, this Click board™ offers the possibility of connecting electrodes through screw terminals or an onboard header if the electrode connection does not match the jack connector. Besides, the user is allowed to process the output signal in analog or digital form. This Click board™ is suitable for medical remote diagnostic equipment applications, such as electrocardiogram (ECG) measurement.

ECG 7 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.

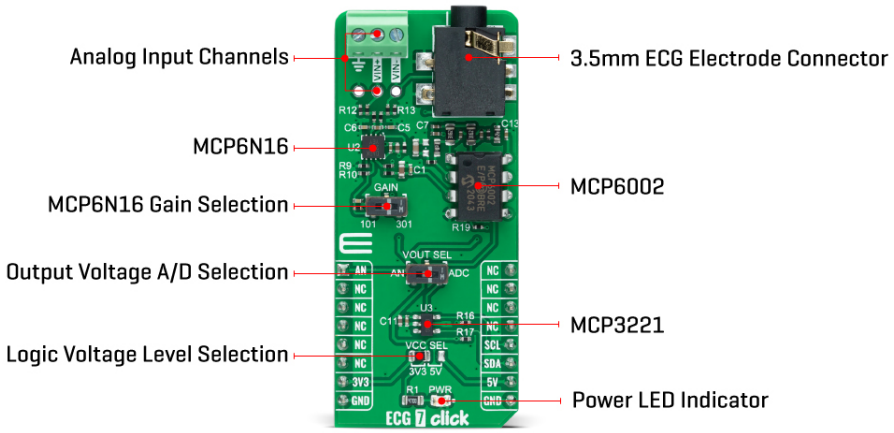
NOTE: This Click board™ represents a development and prototyping tool. It is not intended to be used for a patient's medical treatment and should not be used to diagnose or treat any conditions.

How does it work?

ECG 7 Click as its foundation uses the MCP6N16, a zero-drift instrumentation amplifier designed for single-supply operation with rail-to-rail input and output performance from Microchip. The design of the MCP6N16 is based on a current feedback architecture which allows for the output voltage to be independently set regardless of the input common-mode voltage. Its internal offset correction gives high DC precision, low offset and drift, and negligible noise.

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.
ISO 9001: 2015 certification of quality management system (QMS).

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com



The head part of the board represents a differential amplification stage based on the MCP6N16, with the RC input filter providing a low-pass function for differential mode signals. This part also comes with selectable gain for the MCP6N16, performed by an onboard switch marked as GAIN, allowing users to quickly set the gain on the MCP6N16 to either 101V/V or 301V/V by setting the switch to an appropriate position. After that, the signal from MCP6N16 goes through amplification and buffering by the MCP6002 operational amplifier. Then the signal is ready for further processing in analog or digital format.

As mentioned before, this Click board™ possesses two ways to communicate with the MCU. The output voltage of the MCP6002 Op-Amp can be converted to a digital value using MCP3221 , a successive approximation A/D converter from Microchip, using a 2-wire I2C compatible interface, or can be sent directly to an analog pin of the mikroBUS™ socket labeled as AN. Selection is performed by onboard SMD switch labeled as VOUT SEL to an appropriate position marked as AN and ADC. Using MCP3221 and I2C interface, data transfers at rates of up to 100kbit/s in the Standard and 400kbit/s in the Fast Mode.

In addition to the 3.5mm jack connector reserved for connecting the ECG/EMG cable with ECG electrodes, this Click board™ offers the possibility of connecting electrodes through screw terminals labeled as VIN+ and VIN-, or unpopulated header if the electrode connection does not match the jack connector.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the communication lines properly. However, the Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Biometrics,ECG
Applications	Can be used for medical remote diagnostic equipment applications, such as electrocardiogram (ECG) measurement
On-board modules	MCP6N16 - single zero-drift instrumentation amplifier from Microchip
Key Features	Low power consumption, high DC precision,

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

	gain selection, allow to process the output signal in analog or digital form, flexible ECG signal connections, and more
Interface	Analog,I2C
ClickID	No
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on ECG 7 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Analog Signal	**AN**	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
	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
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
SW1	GAIN	Right	MCP6N16 Gain Selection 101/301: Left position 101, Right position 301
SW2	VOUT SEL	Right	Output Voltage A/D Selection AN/ADC: Left position AN, Right position ADC
J1	-	Unpopulated	ECG Signal Connection Header

ECG 7 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Operating Temperature Range	-40	+25	+120	°C

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

Software Support

We provide a library for the ECG 7 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 ECG 7 Click driver.

Key functions

- ecg7_read_raw_adc This function reads raw ADC value.
- ecg7_read_voltage This function reads raw ADC value and converts it to proportional voltage level.
- ecg7_set_vref This function sets the voltage reference for ECG 7 click driver.

Example Description

This example demonstrates the use of ECG 7 Click board™ by reading and displaying the voltage from VOUT BUFF 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.ECG7

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.

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISOQAR REGISTERED
UKAS MANAGEMENT SYSTEMS
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

TÜV SÜD ISO 9001
ISO 9001: 2015 certification of quality management system (QMS).

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

ECG 7 click 2D and 3D files

ECG 7 Click schematic

ECG 7 click example on Libstock

MCP6N16 datasheet

MCP3221 datasheet

MCP6002 datasheet

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).