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

Cooler Click

PID: MIKROE-6068

Cooler Click is a compact add-on board designed as a cooling solution to manage heat in electronic systems efficiently. This board features the DRV8213, a brushless DC motor driver from Texas Instruments, ensuring a high-performance operation. This board also directly integrates a TMP007 temperature sensor and an MF25060V2-1000U-A99 cooling fan onto its platform, offering a compact and ready-to-use cooling system. It operates across a wide PWM frequency range from 0 to 100kHz, supports both 3.3V and 5V logic levels, and features several protection mechanisms, including undervoltage lockout, overcurrent protection, and overtemperature shutdown. Ideal for various applications, the Cooler Click excels in server rack cooling, embedded systems, development boards, gaming consoles, automotive electronics, and medical equipment, making it a versatile choice for continuous cooling requirements in environments prone to overheating.

Cooler Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

Cooler Click is based on the DRV8213, an advanced brushless DC motor driver from Texas Instruments, as its core component. This innovative board integrates a miniature temperature sensor, TMP007, and a cooling fan, MF25060V2-1000U-A99, right on its surface, making it a ready-to-go cooling solution. It's perfectly suited for use in environments prone to overheating,

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

such as server rack cooling, embedded systems and IoT devices, development board prototyping, gaming consoles and PC cooling, automotive electronics, medical equipment cooling, or similar applications, where continuous cooling is essential.
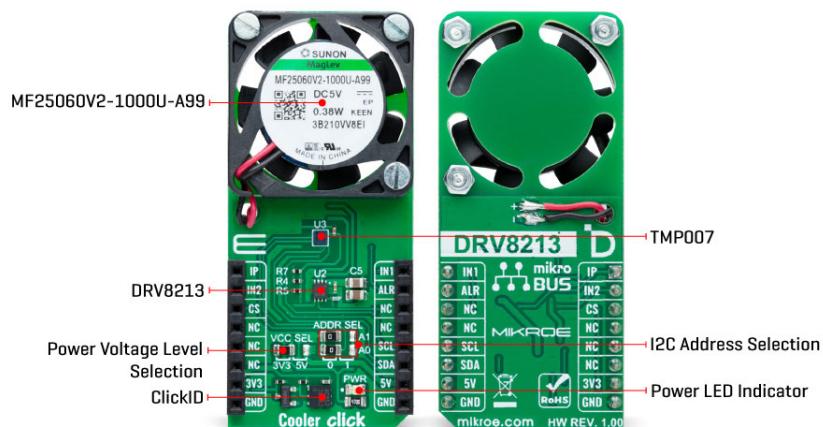
The DRV8213 is a comprehensive motor driver featuring an integrated full-bridge driver with current sensing and regulation capabilities and a unique current sense output. It's designed for efficiency, using a 2-pin PWM interface for motor speed control through the IN1 and IN2 pins on the mikroBUS™ socket, covering a wide PWM frequency range from 0 to 100kHz. Notably, its auto-sleep mode reduces the need for additional GPIO connections for sleep or turn-off functions by automatically entering a low-power mode when not in use. The DRV8213 is also enriched with several protection features, such as undervoltage lockout, overcurrent protection, and overtemperature shutdown, ensuring reliable operation under various conditions.

The TMP007 sensor, another onboard component from Texas Instruments, employs infrared thermopile technology to measure temperatures without direct contact with the object. This capability accurately monitors the surrounding temperature where the Click board™ is placed. The sensor's output is digitized and processed along with the die temperature to compute the object temperature. It uses an I2C interface for communication with the host MCU and an alert function via the ALR pin of the mikroBUS™ socket for temperature exceedance notifications.

Complementing these components is the MF25060V2-1000U-A99 fan, a high-performance cooling fan operating on a 5VDC supply capable of reaching speeds up to 10,000 RPM. This fan is essential for dissipating heat efficiently, ensuring the system remains cool under operation.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Also, this 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	Brushless
Applications	Ideal for server rack cooling, embedded systems, development boards, gaming consoles, automotive electronics, and medical equipment, making it a versatile choice for

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

	continuous cooling requirements in environments prone to overheating
On-board modules	DRV8213 - brushless DC motor driver from Texas Instruments
Key Features	Complete cooling solution, integrated temperature sensor, cooling fan with rotation speed up to 10k RPM, PWM driver control with adjustable frequency, auto Sleep mode, protection features, alert interrupt, and more
Interface	I2C,PWM
Feature	ClickID
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 Cooler Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin		mikro™ BUS			Pin	Notes
Current Monitor	IP	1	AN	PWM	16	IN1	Fan Driver Control 1
Fan Driver Control 2	IN2	2	RST	INT	15	ALR	Alert Interrupt
ID COMM	CS	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	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2-JP3	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

Cooler Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Maximum Rotation Speed	-	-	10.000	PRM

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 Cooler Click as well as a demo application (example), developed using MIKROE compilers. The demo can run on all the main MIKROE development boards.

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

Library Description

This library contains API for Cooler Click driver.

Key functions

- cooler_get_object_temperature This function reads the object's temperature data in degrees Celsius.

- cooler_set_out_state This function controls the operation of the cooler - on/off.

Example Description

This example demonstrates the use of the Cooler click board by reading the target object temperature and controlling the cooler.

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

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Cooler

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 MIKROE compilers.

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™

ClickID

Downloads

TMP007 datasheet

Cooler click example on Libstock

Cooler click 2D and 3D files v100

MF25060V2-1000U-A99 datasheet

DRV8213 datasheet

Cooler click schematic v100