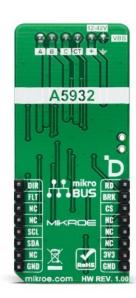MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
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Fan 9 Click

PID: MIKROE-6103

Fan 9 Click is a compact add-on board designed for high-power fan applications requiring low noise and minimal vibration. This board features the A5932, an automotive-grade three-phase sinusoidal sensorless fan controller from Allegro Microsystems. This board operates with a power supply range of 12V to 42V, using a sinusoidal drive to reduce audible noise and vibration. It features I2C communication, PWM speed control, and a red FLT LED indicator for fault conditions. The A5932's adaptive control algorithm optimizes efficiency across various speeds. Ideal for high-speed server fan applications, Fan 9 Click ensures high efficiency and reliable performance.

How does it work?

Fan 9 Click is based on the A5932, an automotive-grade (AEC-Q100 qualified) three-phase sinusoidal sensorless fan controller from Allegro Microsystems. The A5932 integrates sinusoidal drive technology to reduce audible noise and vibration, making it ideal for high-power fan applications. It operates with an external power supply ranging from 12V to 42V through the VBB terminal, targeting high-speed server fan applications to achieve low noise, minimal vibration, and high efficiency. Allegro's proprietary control algorithm optimizes efficiency across various speeds by adapting to different motor characteristics, resulting in a sinusoidal current waveform.

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The A5932 uses a standard fast-mode I2C interface with a clock frequency of 400kHz for programming the EEPROM or serially controlling the IC speed. The fan speed is controlled by a variable duty cycle PWM input via the SCL (SPD) pin, and the SDA (FG) pin provides speed information to the host MCU as an open-drain output. Data transfer initiation does not require a special sequence. If the motor is running, the SDA pin may pull the data line LOW while initializing serial port mode. Sending an I2C command will turn off the motor, similar to receiving a 0% PWM duty command. Additionally, the board features an ISET SEL jumper for setting the gate current magnitude, offering a choice between 15K and 60K resistors, which correspond to approximately 30mA source current and 60mA sink current.

Besides the I2C communication pins, successful control also involves the following mikroBUS™ pins: DIR for fan motor direction control, BRK for fan motor brake control, and RD as an open-drain speed output where a HIGH logic level indicates a rotor fault condition as defined by EEPROM variables. When disabled, the LOW to HIGH transition on the RD pin signifies the end of the open-loop starting sequence. Additionally, a red FLT LED indicator signals fault conditions such as external power supply under/over-voltage, thermal shutdown, charge pump UVLO, overcurrent detection, and loss of synchronization (rotor lock detection). These conditions can also be tracked via the FLT mikroBUS™ pin.

This Click board™ can operate with either 3.3V or an external connected voltage reference (2.8V brought to a VREF header unpopulated by default) as a logic voltage level selected via the VIO SEL jumper. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

Specifications

Type	Brushless
Applications	Ideal for high-speed server fan applications
On-board modules	A5932 - three-phase sinusoidal sensorless fan controller from Allegro Microsystems
Key Features	Automotive-grade, sinusoidal drive technology to minimize noise and vibration, standard fast-mode I2C interface, PWM input for variable speed control, LED indicator for fault detection, offers direction control, brake

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	control, and open-drain speed output, ensures optimized efficiency across various speeds, and more
Interface	GPIO,I2C
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V,External

Pinout diagram

This table shows how the pinout on Fan 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
Open-Drain Speed Output	**RD**	1	AN	PWM	16	**DIR**	Direction Control
Brake Control	**BRK**	2	RST	INT	15	**FLT**	Fault Indicator
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	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	FLT	-	Fault LED Indicator
JP1	VIO SEL	Left	Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	ISET SEL	Left	Gate Drive Current Selection 15k/60k: Left position 15k, Right position 60k

Fan 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
External Power Supply (VBB)	12	-	42	V
External Reference Voltage (VREF)	-	2.8	-	V

Software Support

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).

We provide a library for the Fan 9 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 Fan 9 Click driver.

Key functions

- fan9_set_direction This function is used to set direction of Fan 9 Click board™.

- fan9_write_reg This function reads a data bytes from the selected register by using I2C serial interface.

- fan9_set_pwm This function is used to get PWM value of Fan 9 Click board™.

Example Description

This example demonstrates the use of Fan 9 Click board™, by changing speed of the fan from 0 to 100 percent, then decreasing it back to 0.

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.Fan9

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

Fan 9 click example on Libstock

Fan 9 click 2D and 3D files v100

A5932 datasheet

Fan 9 click schematic v100

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