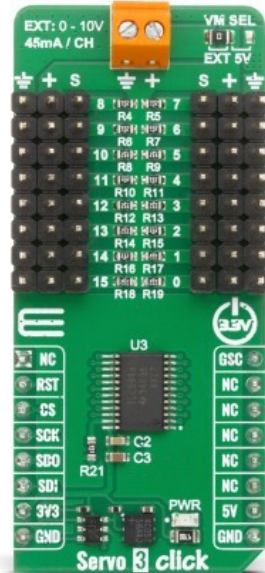


Servo 3 Click



PID: MIKROE-6837

Servo 3 Click is a compact add-on board designed for multi-channel control of up to sixteen [standard hobby servo motors](#) using high-resolution PWM signals. It is based on the [TLC5949](#), a 16-channel constant-current LED driver from [Texas Instruments](#) repurposed here as a finely tunable PWM generator. The device offers 12-bit (4096-step) per-channel grayscale control, 128-step global adjustment, SPI communication up to 33MHz, and six integrated diagnostic flags for fault detection, ensuring stable operation and reliable channel monitoring. The board also features a power-selection jumper that enables flexible servo power sourcing while maintaining a maximum output drive capability of 45mA per channel. These capabilities make Servo 3 Click ideal for synchronized multi-servo control, motion sequencing, interactive mechanical systems, and other applications requiring precise PWM-based actuation.

For more information about **Servo 3 Click** visit the official [product page](#).

How does it work?

Servo 3 Click is based on the TLC5949 from Texas Instruments, to generate finely controlled pulse-width signals suitable for driving up to sixteen standard servo motors. Although the TLC5949 is originally designed as a constant-current sink LED driver for LED video displays, signboards, and other high-channel-count lighting applications, its core architecture makes it uniquely adaptable for servo control in robotic mechanisms, animatronics, automated controls, and educational systems. This is because each of its sixteen channels features an individually adjustable PWM grayscale stage with 4096 steps, allowing precise timing resolution that can be translated into stable servo command pulses. Instead of sourcing current to LEDs, the device is used here to shape digital PWM signals that correspond to servo rotation angles, where the

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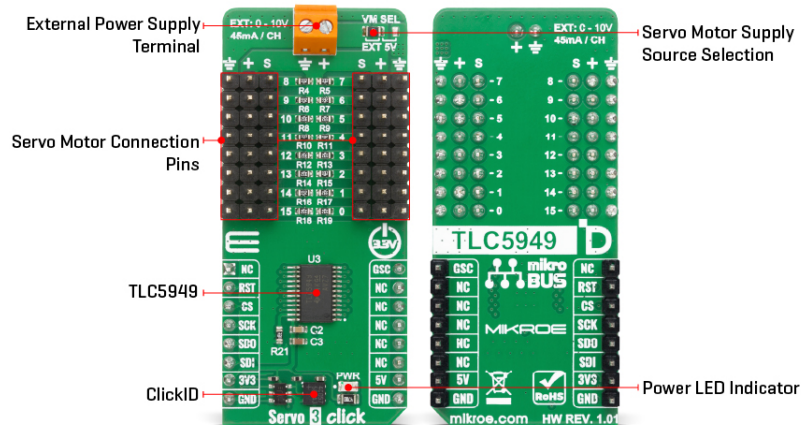


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duty cycle variation determines the shaft position.



The TLC5949 also provides a 128-step global brightness control mechanism, which, although intended for LED intensity matching, serves in this context as a global adjustment layer that unifies pulse characteristics across all channels for consistent servo behavior. Both grayscale (GS) and brightness control (BC) data are accessed through a serial interface, enabling high control timing from the host MCU. Beyond PWM generation, the TLC5949 incorporates six internal error detection mechanisms: LED open detection, LED short detection, output leakage detection, reference current short flag detection, pre-thermal warning, and a thermal error flag. While originally intended for diagnosing LED array faults, these detection features contribute to system reliability when repurposed for servos by allowing the host application to detect anomalies such as unexpected load conditions, potential wiring faults, thermal stress, or irregularities on output channels.

This Click board establishes communication with the host MCU via a 4-wire SPI interface with a maximum clock frequency of 33MHz, ensuring high-speed data transfer. Beyond the SPI pins, the board includes additional GSC pin used as mentioned grayscale pulse width modulation (PWM) reference clock control for output channels (S). It can adjust the power of each output channel using a pulse width modulation control scheme. The architecture of 12 bits per channel results in 4096 steps, from 0% up to 100% power.

Servo 3 Click includes a VM SEL jumper that defines how the attached servo motors receive their supply voltage, allowing developers to adapt the power configuration to their specific application requirements. When the jumper is set to the 5V position, all connected servos are powered directly from the 5V mikroBUS power rail. Alternatively, the jumper can be repositioned to select an external voltage source (EXT position), enabling the use of an independent power input ranging from 0V to 10V delivered through the dedicated screw terminal positioned at the top side of the board. Regardless of the chosen supply mode, each output channel supports a maximum drive current of 45mA, ensuring safe and stable operation across all connected servos.

This Click board operates exclusively on a 3.3V logic voltage level, while the 5V power rail is used only as an optional supply source for the servo motors. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. It also comes equipped with a library containing functions and example code that can be used as a reference for further development.

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Specifications

Type	Servo
Applications	Ideal for synchronized multi-servo control, motion sequencing, interactive mechanical systems, and other applications requiring precise PWM-based actuation
On-board modules	TLC5949 - 16-channel constant-current LED driver from Texas Instruments
Key Features	Sixteen high-resolution PWM output channels with 12-bit (4096-step) grayscale control, a 128-step global adjustment layer for unified pulse behavior, six diagnostic flags for detecting open outputs, short circuits, leakage, reference-current faults, and thermal conditions, a maximum drive capability of 45mA per channel, and more
Interface	PWM,SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V,5V,External

Pinout diagram

This table shows how the pinout on Servo 3 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	GSC	Grayscale PWM Control
ID SEL	RST	2	RST	INT	15	NC	
SPI Select / ID COMM	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
SPI Data OUT	SDO	5	MISO	SCL	12	NC	
SPI Data IN	SDI	6	MOSI	SDA	11	NC	
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	VM SEL	Left	Servo Motor Supply Source Selection EXT/5V: Left position EXT, Right position 5V

Servo 3 Click electrical specifications

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Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	0	-	10	V
Maximum Output Drive Current per Channel	-	-	45	mA
PWM Resolution	-	12	-	bit

Software Support

[Servo 3 Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

Example Description

This example demonstrates the use of the Servo 3 Click board for controlling the angle of servo motors. The board is capable of driving multiple servos, and the example illustrates how to change the angle of all connected servos simultaneously within a defined range.

Key Functions

- `servo3_cfg_setup` This function initializes Click configuration structure to initial values.
- `servo3_init` This function initializes all necessary pins and peripherals used for this Click board.
- `servo3_set_angle` This function sets the servo angle for a specific channel or all channels.
- `servo3_update_output` This function updates the PWM output values for all channels by writing them to the device.

Application Init

Initializes the logger module and configures the Servo 3 Click board. The PWM communication is established, and the device is prepared for controlling the servos.

Application Task

Gradually changes the angle of all connected servo motors from a minimum to a maximum value, and then back to the minimum, creating a sweeping motion. The current angle is logged during each update.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO

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Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[Servo 3 click example package](#)

[Servo 3 click 2D and 3D files v101](#)

[TLC5949 datasheet](#)

[Servo 3 click schematic v101](#)

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