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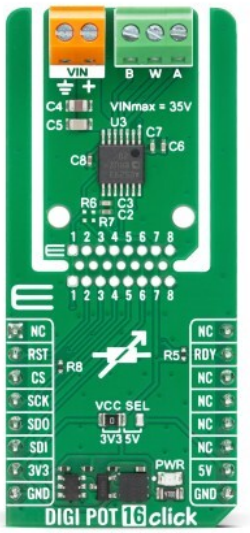
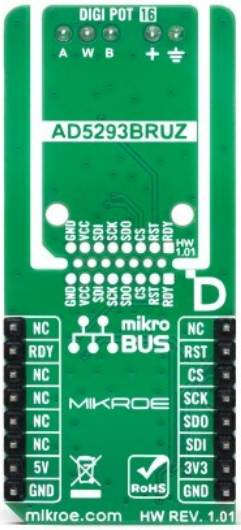
DIGI POT 16 Click





PID: MIKROE-6979

DIGI POT 16 Click is a high-voltage digital potentiometer for precise resistance adjustment and programmable voltage division in embedded and industrial systems. It features the AD5293BRUZ-20-RL7 from Analog Devices, providing one 20kΩ channel, 10-bit resolution, 1,024 wiper positions, calibrated ±1% resistance accuracy, and a separate 9V to 33V analog supply. SPI control enables wiper programming, register readback, reset, ready monitoring, and software shutdown, while selectable 3.3V or 5V logic, ClickID, and Click Snap improve integration. VIN and B-W-A screw terminals simplify connections. It is suitable for sensor calibration, gain and offset adjustment, programmable supplies, filters, instrumentation, and industrial control systems.

For more information about **DIGI POT 16 Click** visit the official product page.

How does it work?

DIGI POT 16 Click is based on the AD5293BRUZ-20-RL7, a single-channel, 1024-position digital potentiometer from Analog Devices. This 20kΩ device provides 10-bit wiper resolution and performs the same electronic adjustment function as a mechanical potentiometer while offering repeatable digital control, solid-state reliability, and low temperature drift. Its high-voltage architecture supports analog signals across a wide supply range, making it suitable for mechanical potentiometer replacement, gain and offset adjustment, sensor calibration, programmable voltage-to-current conversion, adjustable filters, and programmable power supplies. The AD5293 operates across an extended temperature range from -40°C to +105°C.

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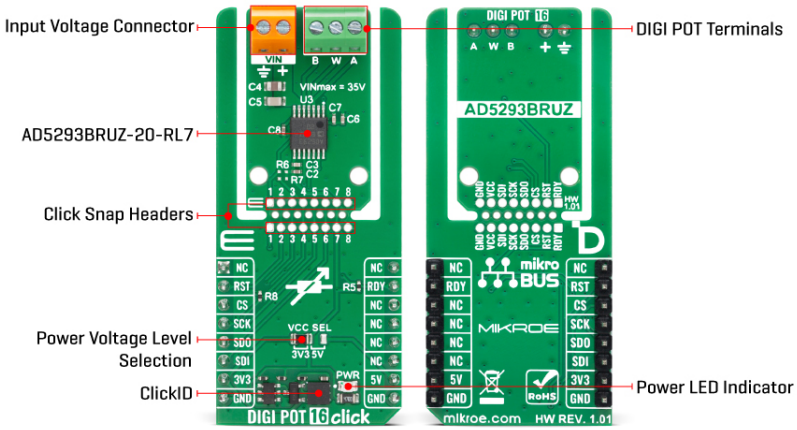

The wiper position is controlled by a volatile 10-bit RDAC register that supports an unlimited number of adjustments. On power-up, the RDAC register is initialized to midscale and protected against changes until wiper updates are enabled through the control register. The AD5293 can operate as a three-terminal potentiometer for programmable voltage division or as a two-terminal rheostat for variable resistance control. Its default resistor-performance mode provides calibrated ±1% resistance accuracy within the specified supply and code ranges, along with a typical rheostat temperature coefficient of 35ppm/°C. Voltage-divider operation reduces the typical ratiometric temperature coefficient to only 5ppm/°C. A software shutdown mode opens terminal A and connects the wiper W to terminal B without changing the stored RDAC value. For the 20kΩ version, a finite resistance of approximately 120Ω remains at zero scale, while the continuous current through the resistor terminals must be limited to ±3mA.

DIGI POT 16 Click communicates with the host MCU through an SPI-compatible serial interface supporting clock frequencies up to 50MHz. Commands are transferred MSB first in 16-bit frames containing control and 10-bit RDAC data fields. The serial clock is connected to the SCK pin, the AD5293 data input is routed to SDI on the COPI/MOSI pin, the open-drain serial data output is routed to SDO on the CIPO/MISO pin, and the CS line controls the device’s active-low SYNC input. SDO supports RDAC and control-register readback and requires a suitable pull-up when used. The RDY output is routed to the INT pin and returns high when an RDAC read or write operation is complete. The RST pin resets the RDAC register to midscale on a low-to-high transition. RST also serves as the ClickID selection signal, while CS is shared between the AD5293 frame-selection function and ClickID communication.

A two-position VIN screw terminal provides the external supply for the high-voltage potentiometer section, while a three-position screw terminal exposes the B, W, and A terminals for direct connection to the application circuit. The board configures the AD5293 for single-supply operation by connecting VSS to ground, so all voltages applied to A, W, and B must remain between ground and VIN. Although the PCB is marked with a maximum VIN value of 35V, the specified AD5293 single-supply operating range is 9V to 33V, and 35V represents an absolute maximum rating rather than a normal operating condition. The board also includes a PWR LED indicator, ClickID for automatic board identification, and Click Snap functionality. The main potentiometer section can be detached along the predefined snap lines and accessed through the duplicated pads marked 1 through 8 for more flexible installation.

DIGI POT 16 Click uses either the 3.3V or 5V power rail for the AD5293 logic section, selected through the VCC SEL jumper, which is set to 3.3V by default. The ClickID circuit is powered from the 3.3V rail, while the resistor section receives its separate high-voltage supply through

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the VIN connector, with all supply domains sharing a common ground. This Click board™ comes with a library containing easy-to-use functions and a ready-to-use code example that can be downloaded and used as a reference for further development.

Click Snap

Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the official page dedicated to this feature.

Specifications

Type	Digital potentiometer
Applications	Ideal for applications such as sensor calibration, gain and offset adjustment, programmable power supplies, adjustable filters, voltage-to-current conversion, instrumentation, and industrial control systems
On-board modules	AD5293BRUZ-20-RL7 - 20kΩ single-channel, 1024-position digital potentiometer with calibrated ±1% resistor tolerance from Analog Devices
Key Features	20kΩ single-channel digital potentiometer, 10-bit resolution, 1,024 wiper positions, calibrated ±1% resistor tolerance in resistor-performance mode, potentiometer and rheostat operation, SPI interface up to 50MHz, register readback, ready indication, hardware reset, software shutdown, selectable 3.3V or 5V logic, separate high-voltage analog supply, ClickID, Click Snap, and more
Interface	SPI
Feature	Click Snap,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 DIGI POT 16 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	NC	

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Reset / ID SEL	**RST**	2	RST	INT	15	**RDY**	Ready Indication
Device Enable / ID COMM	**CS**	3	CS	RX	14	NC	
SPI SCK	**SCK**	4	SCK	TX	13	NC	
SPI SDI	**SDI**	5	MISO	SCL	12	NC	
SPI SDO	**SDO**	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	VCC SEL	Left	Power/Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
TB1	VIN	-	Input Connector
CN1	-	-	3 Position (B, W, A) Terminal

DIGI POT 16 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
VIN	-	-	35	V
Resistance	0	-	20	kΩ
Resolution	-	1024	-	step
Temperature Range	-40	-	105	°C

Software Support

DIGI POT 16 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 DIGI POT 16 Click board for controlling the digital potentiometer wiper position. The application continuously changes the wiper value across its range to simulate variable resistance.

Key Functions

- digipot16_cfg_setup This function initializes Click configuration structure to initial values.
- digipot16_init This function initializes all necessary pins and peripherals used for this Click board.
- digipot16_default_cfg This function executes a default configuration of DIGI POT 16 Click board.
- digipot16_set_wiper This function sets the wiper position by sending Command 1 via SPI.

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- digipot16_get_wiper This function reads back the current wiper position from the RDAC register.
- digipot16_get_resistance This function calculates the resistance values between the wiper and both terminals (RWB and RWA).

Application Init

Initializes the logger and DIGI POT 16 Click driver, and applies the default configuration.

Application Task

Periodically sweeps the wiper position back and forth across the full scale range (0 to 1023) in steps of 33. Logs the current wiper position and the corresponding calculated resistances RWB and RWA to the serial terminal.

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 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

DIGI POT 16 Click example package

DIGI POT 16 Click 2D and 3D files v101

DIGI POT 16 Click schematic v101

AD5293 datasheet

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