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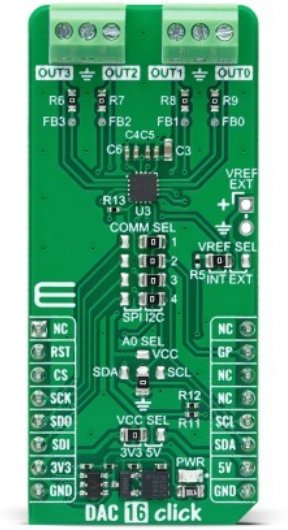
DAC 16 Click



PID: MIKROE-6209

DAC 16 Click is a compact add-on board, a digital-to-analog converter (DAC) designed for precise voltage and current output applications. This board features the DAC63204-Q1, an automotive-qualified 12-bit DAC from Texas Instruments. This Click board™ features four output channels with flexible configuration options, including adjustable voltage gains and selectable current ranges from ±25µA to ±250µA. It also supports both internal and external voltage references and offers a Hi-Z power-down mode for enhanced protection. Communication with the host MCU is enabled through either a 4-wire SPI or I2C interface, with configurable I2C addresses and a general-purpose I/O pin for additional functionality. This Click board™ is ideal for voltage margining, DC biasing and calibration, and waveform generation, where precision and reliability are critical.

How does it work?

DAC 16 Click is based on the DAC63204-Q1, a highly reliable, automotive-qualified, quad-channel, buffered digital-to-analog converter (DAC) from Texas Instruments. This 12-bit DAC is versatile, providing both voltage and current outputs, making it ideal for various applications such as voltage margining and scaling, DC set-point biasing and calibration, and waveform generation. One of its key features is the Hi-Z power-down mode, which ensures that the outputs maintain a high-impedance state during power-off conditions, offering additional protection and minimizing power consumption.

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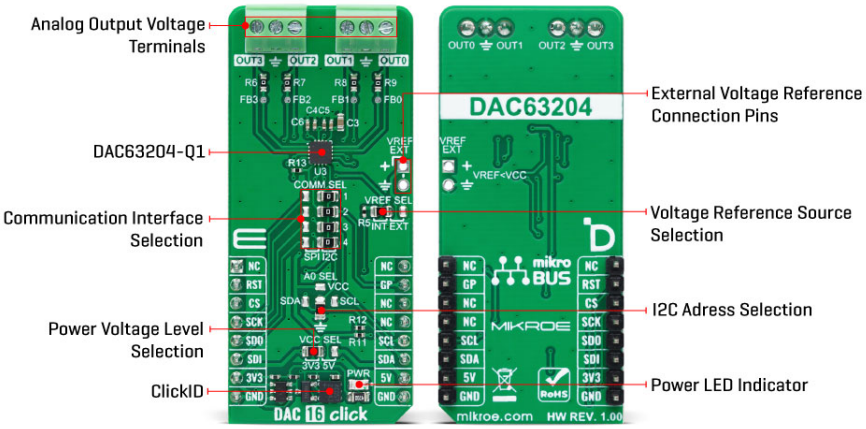

The DAC63204-Q1 supports flexible configuration of its output channels (OUT0-OUT3). For voltage outputs, it provides a 1LSB differential non-linearity (DNL) and allows for adjustable gains, with options of 1x, 1.5x, 2x, 3x, and 4x. For current outputs, it offers a range of ±25µA to ±250µA, with 1LSB integral non-linearity (INL) and DNL (8-bit), making it suitable for precision applications requiring fine control over current delivery.

This DAC can operate using either an internal reference, an external reference (selectable via an unpopulated VREF EXT header), or the power supply itself as the reference. The full-scale output can range from 1.8V to 5V, depending on the reference source. Selection between the internal and external voltage reference is easily managed by positioning the VREF SEL jumper to either the INT or EXT position.

Communication with the host MCU is made through either a 4-wire SPI or I2C interface. The SPI interface supports clock frequencies up to 50MHz, while the I2C interface operates up to 1MHz. The desired communication protocol can be selected via the four COMM SEL jumpers, with the I2C interface being set as the default. Additionally, the I2C interface allows for flexible address configuration using the ADDR SEL jumper, offering four selectable I2C addresses (with 0x48 set by default).

Beyond communication, DAC 16 Click also provides a general-purpose I/O (GP) pin, which is highly configurable for various functions, such as serving as an SDO pin, LDAC, power-down (PD), status indicator, protection, fault dump, or reset. The specific function of the GP pin can be configured through the register map and programmed into non-volatile memory (NVM) for persistent settings.

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	DAC
Applications	Ideal for voltage margining, DC biasing and calibration, and waveform generation
On-board modules	DAC63204-Q1 - quad-channel, buffered digital-

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	to-analog converter (DAC) from Texas Instruments
Key Features	12-bit quad-channel DAC, AEC-Q100 qualified, flexible output configuration (gain and current range), Hi-Z power-down modes, multiple reference options, dual communication interfaces, configurable general-purpose I/O pin, and more
Interface	I2C,SPI
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 DAC 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	
ID SEL	**RST**	2	RST	INT	15	**GP**	Multipurpose GPIO
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	**SCL**	I2C Clock
SPI Data IN	**SDI**	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-JP5	COMM SEL	Right	Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C
JP6	VREF SEL	Left	Voltage Reference Source Selection INT/EXT: Left position INT, Right position EXT
JP7	ADDR SEL	Lower	I2C Address Selection VCC/SDA/GND/SCL:

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			Upper position VCC, Left position SDA, Lower position GND, Right position SCL

DAC 16 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	1.8	-	5	V
Output Current	±25	-	±250	µA
Resolution	-	12	-	bit

Software Support

We provide a library for the DAC 16 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 DAC 16 Click driver.

Key functions

- dac16_set_dac_data This function sets the raw DAC data for the selected DAC channel.
- dac16_start_function_gen This function starts the function generator for the selected DAC channel.
- dac16_stop_function_gen This function stops the function generator for the selected DAC channel.

Example Description

This example demonstrates the use of DAC 16 Click board™ by changing the voltage level on the OUT0 as well as the waveform signals from a function generator on the OUT1.

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.DAC16

Additional notes and informations

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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

DAC 16 click example on Libstock

DAC 16 click 2D and 3D files v100

DAC 16 click schematic v100

DAC63204-Q1 datasheet

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