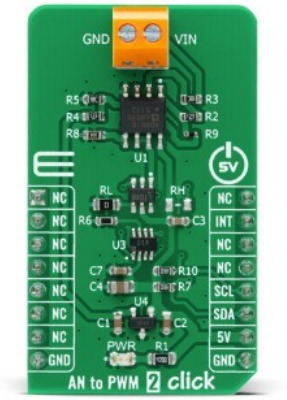
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

AN to PWM 2 Click



PID: MIKROE-4221

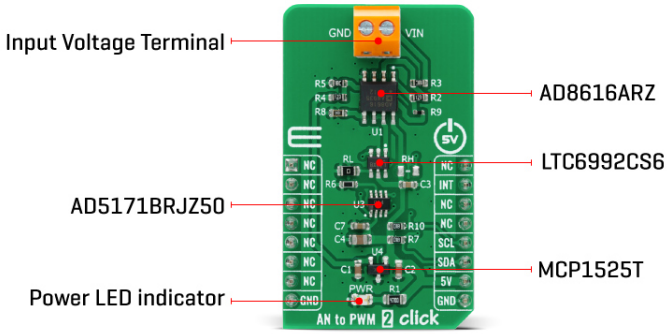
AN to PWM 2 Click is a compact add-on board that contains an easy-to-use component that converts the value of the input analog signal to a fixed frequency PWM voltage output, with a duty cycle proportional to the input voltage. This board features the LTC6992CS6, a silicon oscillator with an easy-to-use analog voltage-controlled pulse width modulation (PWM) capability from Analog Devices. It features the PWM signal controlled by analog input in range of -2.5V to 2.5V, frequency range up to 1 MHz, frequency error less than 1.7%, and it has good temperature stability. It has many features that make it well suited for heater control, PWM servo loops, LED dimming, signal isolation, and other duty cycle control applications.

AN to PWM 2 Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

AN to PWM 2 Click is based on the LTC6992CS6, a voltage-controlled PWM generator from Analog Devices. This device is chosen because it keeps its output clocking at all times, and it offers glitch-free, a first cycle-accurate startup within 500µs of Power-On. The output of the this Click board™ can source or sink up to 16 mA, and it has a linear response, so applying a voltage in a range of -2.5 to 2.5V on its input, will result in generating the PWM pulse train with duty cycle linearly proportional to the input voltage. The output PWM signal is brought to the INT pin of the mikroBUS™ socket to enable fast and precise duty cycle measurement using the interrupt routines.

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



The LTC6992CS6 has a MOD pin which represents pulse-width modulation input where is necessary to bring an analog signal. To bring the corresponding signal to that pin, this Click board™ uses an analog circuitry made of OpAmp AD8616ARZ from Analog Devices. In the first part of the circuit, amplifier OPA1 attends to adjust the input signal through a reference voltage of 2.5V by the MCP1525 from Microchip and applied input voltage in a range of -2.5 to 2.5V. The next part of the circuit is the voltage divider and amplifier OPA2 which has the function of a buffer, after which the signal required by the MOD pin of the LTC6992CS6 is obtained.

The output frequency can range up from 3.81Hz to 1MHz and is controlled via the AD5171, a 64-position (OTP) digital potentiometer from Analog Devices, which programs the LTC6992CS6's internal master oscillator frequency. The output frequency is determined by this master oscillator and an internal frequency divider programmable to eight settings from 1 to 16384. It communicates with MCU using the standard I2C serial interface that operates at clock rates up to 400 kHz and represents the most accurate way to set the frequency. It's also left the possibility to adjust the frequency via resistors RH and RL by placing resistors of appropriate resistance.

This Click Board™ is designed to be operated only with a 5V logic level. A proper logic voltage level conversion should be performed before the AN to PWM 2 Click is used with MCUs with different logic levels. More information about the LTC6992CS6's functionality, electrical specifications, and typical performance can be found in the attached datasheet. However, the Click board™ comes equipped with a library that contains easy-to-use functions, and a usage example that can be used as a reference for the development.

Specifications

Type	ADC
Applications	Can be used for heater control, PWM servo loops, LED dimming, signal isolation, and other duty cycle control applications.
On-board modules	AN to PWM 2 Click is based on the LTC6992CS6, a voltage-controlled PWM generator from Analog Devices.
Key Features	Low power consumption, good temperature stability, wide frequency range, low frequency error, and more.

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

Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	5V

Pinout diagram

This table shows how the pinout on AN To PWM 2 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	
	NC	2	RST	INT	15	**INT**	PWM Output
	NC	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
	NC	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

AN To PWM 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Input Supply Voltage	-2.5	-	+2.5	V
Output Current	-	±20	-	mA
Output Frequency	3.81 Hz	-	1	MHz

Software Support

We provide a library for the AN to PWM 2 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 AN to PWM 2 Click driver.

Key functions

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

- antopwm2_set_frequency This function sets a frequency output in a range from 500kHz to 1MHz by setting the digipot resistance.

- antopwm2_set_frequency_otp This function sets a frequency output in a range from 500kHz to 1MHz by setting the digipot resistance in OTP mode.

Example Description

This example demonstrates the use of AN to PWM 2 Click by changing the PWM output frequency from 500kHz to 1MHz in steps of 50kHz.

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.ANtoPWM2

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™

Downloads

AN To PWM 2 click 2D and 3D files

AN To PWM 2 click example on Libstock

AN To PWM 2 click schematic

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

AD5171 datasheet