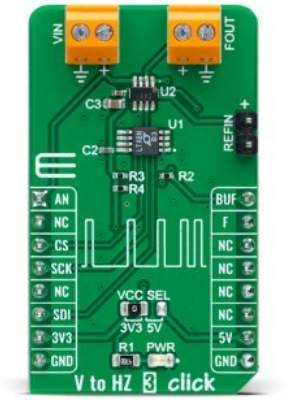
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V to Hz 3 Click





PID: MIKROE-5250

V to Hz 3 Click is a compact add-on board that converts an analog voltage input signal into a specific frequency pulse wave signal. This board features the AD7740, an ultrasmall synchronous voltage-to-frequency converter from Analog Devices. The AD7740 has a linear response, so applying a voltage from 3V up to 5V on its VIN terminal will generate the pulse with a frequency linearly proportional to the input voltage. It contains an integrated 2.5V bandgap reference defining the span of the VFC and can be overdriven using an external reference. The full-scale output frequency is synchronous with the input clock signal provided by the LTC6903 programmable oscillator, with a maximum input frequency of 1MHz. Based on the analog input value, the output frequency goes from 10% to 90% of the input frequency. This Click board™ is the most suitable for low-cost analog-to-digital conversion, linear frequency modulation, voltage-to-frequency conversion, and as a variable clock signal generator.

V to Hz 3 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.

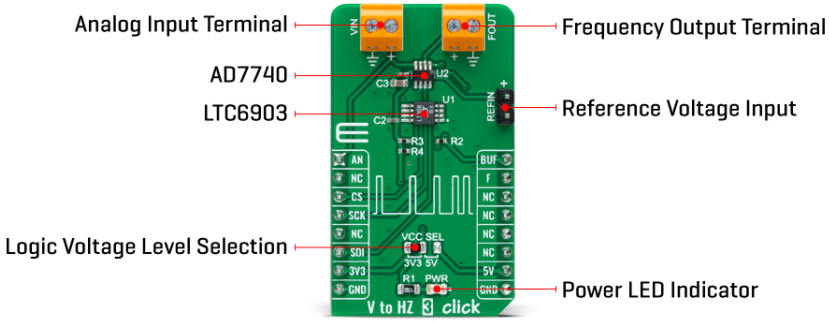
How does it work?

V to Hz 3 Click as its foundation uses the AD7740, a CMOS synchronous Voltage-to-Frequency Converter (VFC), which uses a charge-balanced conversion technique from Analog Devices. The input voltage signal from 0V up to 5V from its VIN terminal is applied to a proprietary front-end based around an analog modulator that converts the input voltage into an output pulse train. Depending on the analog input value, the output frequency goes from 10% to 90% of the input frequency provided by the SPI-configurable LTC6903 programmable oscillator, with a maximum

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input frequency of 1MHz.



The analog input signal to the AD7740 is continuously sampled by a switched capacitor modulator whose sampling rate is set by a master clock (primary input frequency of the AD7740). The input signal may also be buffered, setting the BUF pin of the mikroBUS™ socket to a high logic state before being applied to the sampling capacitor of the modulator, isolating the sampling capacitor charging currents from the analog input pin. The AD7740 also contains an on-chip 2.5 V default bandgap reference, the reference input to the core of the AD7740 defining the span of the VFC. Alternatively, an external reference may be used to overdrive the internal reference by applying it to an onboard header marked as REFIN.

Alongside SPI communication, this Click board™ also uses several additional pins. The BUF pin mentioned above represents the Buffered mode selection, while the AN pin indicates the presence of an external analog signal. The last of the enabled pins is the F signal, routed to the INT pin of the mikroBUS™ socket, which can also serve as output frequency from the AD7740 in the same way as the FOUT terminal.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the communication lines properly. However, the 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	Measurements
Applications	Can be used for low-cost analog-to-digital conversion, linear frequency modulation, voltage-to-frequency conversion, and as a variable clock signal generator
On-board modules	AD7740 - voltage-to-frequency converter from Analog Devices LTC6903 - programmable oscillator from Analog Devices
Key Features	Synchronous operation, output frequency provided by programmable oscillator, low power consumption, internal 2.5V reference,

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	1MHz maximum input frequency, selectable high impedance buffered input, and more
Interface	SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V,External

Pinout diagram

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

Notes	Pin	mikroBUS				Pin	Notes
Analog Input Indicator	**AN**	1	AN	PWM	16	**BUF**	Buffered Mode
	NC	2	RST	INT	15	**F**	AD7740 Frequency
SPI Chip Select	**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	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
J1	REFIN	Populated	External Reference Voltage Connection

V to Hz 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Analog Input Range VIN	0	-	5	V
Output Frequency Range FOUT	-	-	1	MHz
Operating Temperature Range	-40	+25	+105	°C

Software Support

We provide a library for the V to Hz 3 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Package can be downloaded/installed directly from NECTO Studio Package

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Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for V to Hz 3 Click driver.

Key functions

- vtohz3_set_input_frequency This function enables and sets output frequency of the programmable oscillator, which is the AD7740 input frequency.
- vtohz3_read_an_pin_voltage This function reads results of AD conversion of the AN pin and converts them to proportional voltage level.
- vtohz3_get_frequency This function converts voltage to the estimated output frequency in Hz.

Example Description

This example demonstrates the use of the V to Hz 3 Click board™ by calculating the estimated output frequency from the input voltage.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.VtoHz3

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 MikroElektronika compilers.

mikroSDK

This Click board™ is supported with mikroSDK - MikroElektronika 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

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Click board™ Catalog

Click Boards™

Downloads

LTC6903 datasheet

V to Hz 3 click 2D and 3D files

V to Hz 3 click example on Libstock

AD7740 datasheet

V to Hz 3 click schematic

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