



V to Hz 2 click

PID: MIKROE-3131

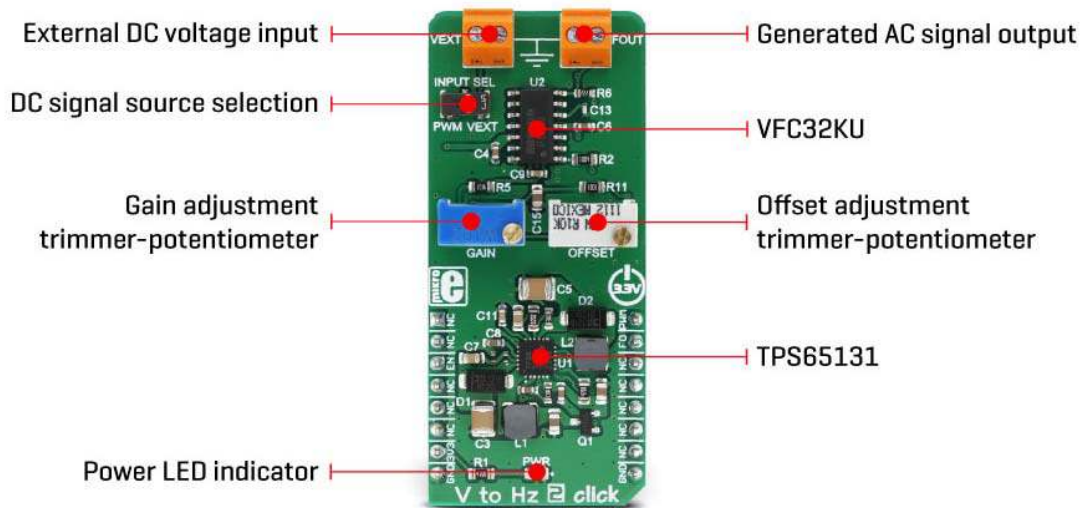
Weight: 30 g

V to Hz 2 click is a device that converts an analog voltage input signal into a pulse wave signal of a certain frequency. It has a linear response, so applying a voltage in a range of 0 to 3.3V on its input, will result in generating the pulse train with frequency linearly proportional to the input voltage. This click features very good linearity, covers a frequency range between 200 Hz to 120 kHz, and it has good temperature stability.

This device is well suited to be used in a number of various voltage to frequency applications: it can be used in instrumentation applications, industrial, and automation markets. It is well suited for use in AD conversion, long-term integration, linear frequency modulation, voltage-to-frequency conversion and it can be used as the variable clock signal generator. Its function can be complemented by the Hz to V 2 click, which does the opposite type of conversion: frequency into DC voltage. This can be utilized to build an FM modulator/demodulator application, for example.

How does it work?

The main component of the V to Hz 2 click is the VFC32KU, a voltage-to-frequency and frequency-to-voltage converter from Microchip. It accepts voltage at its input and generates a pulse train, with a frequency linearly proportional to the input voltage. The pulse train is routed to a screw terminal labeled as FOUT, as well as the mikroBUS™ INT pin, labeled as FO. The signal can be then further processed by the host MCU.



When V to Hz 2 click is operated for the first time, it needs to be calibrated. The click is equipped with two variable resistors for gain and offset fine-tuning. A calibration procedure should be executed before the first use of the Click board™ since even slight variations in the components tolerances could affect the value at the output. It is recommended to correct the offset after longer time intervals, to compensate for the aging of the passive components on the Click board™. It is done by introducing a known voltage at the input, and adjusting the gain and the offset, until the signal with the expected frequency appears on the output.

As already discussed, V to Hz 2 click is equipped with the input voltage terminal (VEXT), which is used to connect the control voltage up to 3.3V. Besides having control voltage input on this terminal, it is possible to select the voltage generated by the MCU as the control voltage input, too. INPUT SEL switch can be set so that the PWM pin from the mikroBUS™ is used as the control voltage input. The PWM signal generated by the MCU is filtered out by the onboard low pass filter so that the control voltage remains constant.

The VFC32KU IC requires a dual power supply with $\pm 15V$. Therefore, this Click board™ utilizes another IC in order to provide the required voltages. It uses the TPS65131, a positive and negative output DC/DC Converter, from Texas Instruments. This DC/DC converter has already been used in Boost-INV 2 click, so it was tested "on the field" for this purpose. Providing well-stabilized output with the plenty of power headroom, it is a perfect solution for the V to Hz 2 click, also.

To enable the conversion circuitry, the EN pin of the TPS65131 boost converter should be pulled to a HIGH logic level. This will activate the boost converter and provide the required power for the VFC32KU IC. This pin is routed to the mikroBUS™ CS pin and it is labeled as EN.

Specifications

Applications	It is well suited for use in AD conversion, long-term integration, linear frequency modulation, voltage-to-frequency conversion and it can be used as the variable clock signal generator
On-board modules	VFC32KU, a voltage-to-frequency and frequency-to-voltage converter from Texas Instruments; TPS65131, a positive and negative output DC/DC Converter, from Texas Instruments
Key Benefits	V to HZ click features very good linearity, covers a wide frequency range and it has good temperature stability. Onboard high-precision trimmer potentiometers for increased accuracy of the converted pulse train signal, and its frequency persistence
Interface	GPIO,PWM
Input Voltage	3.3V
Click board size	M (42.9 x 25.4 mm)


Onboard jumpers and settings

Label	Name	Default	Description
LD1	PWR	-	Power LED indicator
SW1	INPUT SEL	Left	Input signal source selection: left position mikroBUS™ FIN

			pin, right position FEXT input terminal
TB1	FOUT	-	Converted AC voltage output
TB2	VEXT	-	External DC input signal

Pinout diagram

This table shows how the pinout on **V to Hz 2 click** corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	PWM	PWM IN
	NC	2	RST	INT	15	FO	AC Signal OUT
Boost IC Enable	EN	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	3.3V	7	3.3V	5V	10	NC	
Ground	GND	8	GND	GND	9	GND	Ground

Software support

We provide a library for the V to Hz 2 Click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Library Description

Library initializes and defines GPIO driver and performs commands that can enable or disable the device and get frequency (FOUT) by getting the state of the INT pin. For more details check the documentation.

Key functions :

- `void vtohz2_enable(uint8_t state)` - The function performs enabling and disabling of the device.
- `uint8_t vtohz2_getFreqOut(void)` - The function gets the out frequency on mikroBUS INT pin.

Example description

The application is composed of three sections:

- System Initialization - Initializes peripherals and pins.
- Application Initialization - Initializes GPIO driver, performs the device enable and sets the PWM frequency. Also writes help with the possible instructions.
- Application Task - (code snippet) - Checks which command be entered on UART and sets the PWM duty cycle depending on the entered command.

```
void applicationTask()
{
    if (UART_Rdy_Ptr())
    {
        rxDat = UART_Rd_Ptr();

        if ((rxDat == '+') && (percCheck < 100))
        {
            pwmDutySum += onePercPwm;
            percCheck += 1;
        }
        else if ((rxDat == '-') && (percCheck > 0))
        {
            pwmDutySum -= onePercPwm;
            percCheck -= 1;
        }
        else if ((rxDat == '*') && (percCheck <= 90))
        {
            pwmDutySum += tenPercPwm;
            percCheck += 10;
        }
        else if ((rxDat == '/') && (percCheck >= 10))
        {
            pwmDutySum -= tenPercPwm;
            percCheck -= 10;
        }
        else if (rxDat == 'h')
        {
            vtohz2_writeHelp();
        }
    }

    pwmDuty = pwmDutySum;
}
```

```
vtohz2_setSpeed( pwmDuty );

mikrobus_logWrite( "PWM Duty is : ", _LOG_TEXT );
WordToStr( percCheck, text );
mikrobus_logWrite( text, _LOG_TEXT );
mikrobus_logWrite( " %", _LOG_LINE );
}
}
```

Additional functions :

- **void vtohz2_writeHelp()** - Writes instructions that perform the determined commands.
- **void vtohz2_setSpeed(uint16_t pwm_duty)** - Determines the desired PWM duty cycle and checks the limit of the PWM duty.
- **void vtohz2_pwmInit(uint32_t pwm_freq)** - Initializes the PWM with the desired frequency and calculates the maximal value of the PWM duty cycle.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- Conversions
- PWM
- UART

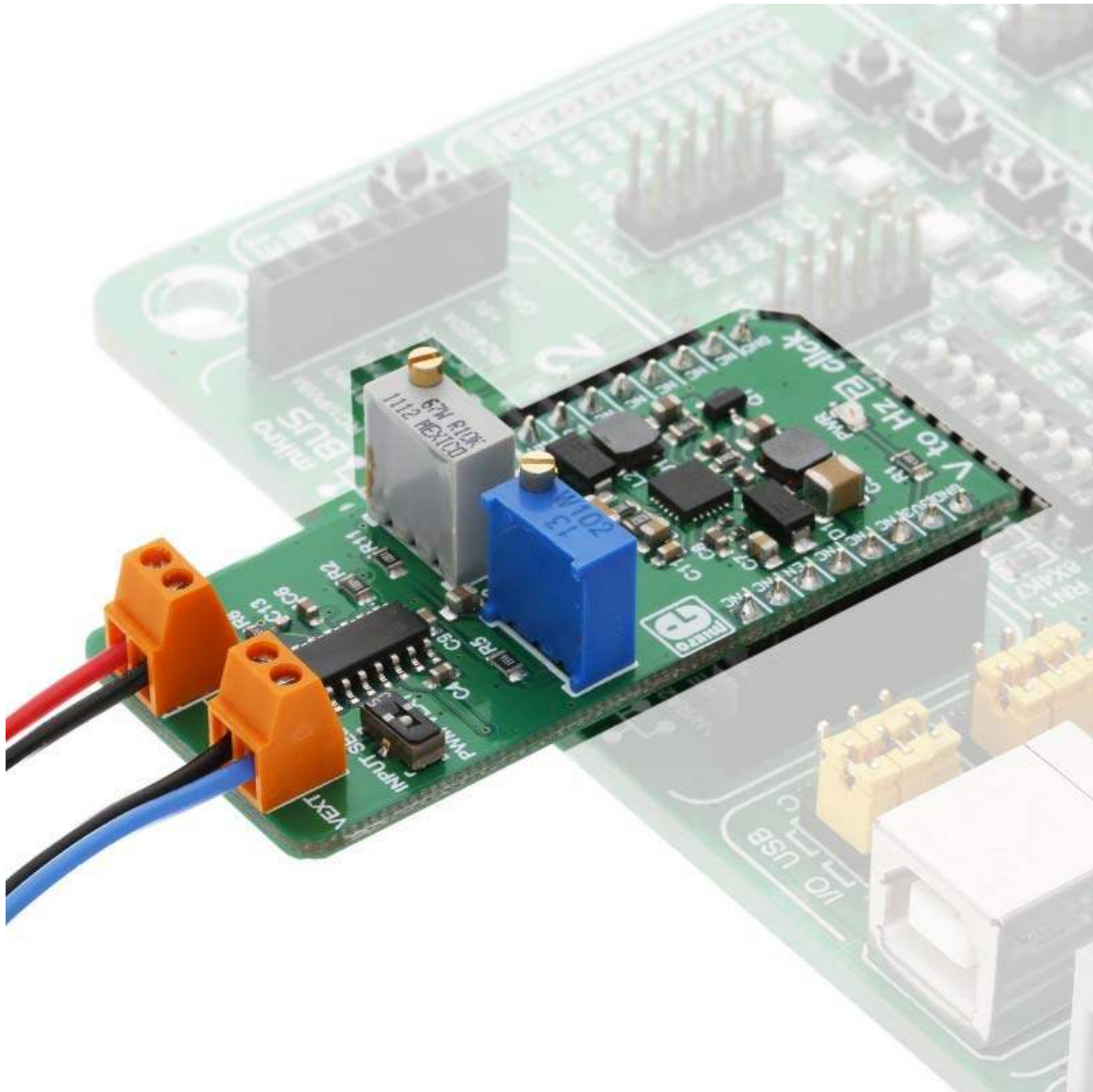
Additional notes and information

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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

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.



https://www.mikroe.com/v-to-hz-2-click?search_query=MIKROE-3131&results=1-9-19-18