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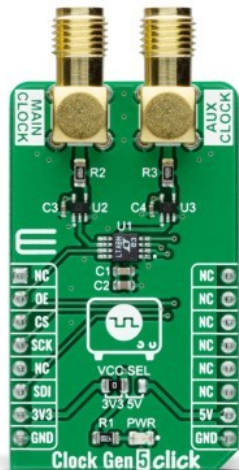www.mikroe.com

Clock Gen 5 Click

PID: MIKROE-4413

Clock Gen 5 Click is a compact add-on board that contains a digital programmable oscillator solution. This board features the LTC6903, a low-power self-contained digital frequency source providing a precision frequency from 1kHz to 68MHz set through a 3-wire SPI digital interface from Analog Devices. The LTC6903 features a proprietary feedback loop that linearizes the relationship between digital control setting and frequency and provides a smaller, more reliable, and vastly more versatile clocking solution. The frequency between 1kHz and 68MHz is set by a 16-bit control word, typically accurate within 1.1% with a resolution of 0.1% or better. This Click board™ is suitable for applications such as MCU clock source, clock source for a switched capacitor filter, or general replacement for a DAC/VCO combination.

Clock Gen 5 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?

Clock Gen 5 Click is based on the LTC6903, a low-power self-contained digital frequency source providing a precision frequency from 1kHz to 68MHz set through a 3-wire digital interface from Analog Devices. The LTC6903 contains an internal feedback loop that controls a high-frequency square wave (VCO) operating between 34MHz and 68MHz. It is also a resistor controlled oscillator that offers an integrated serial resistor DAC and a set of digital frequency dividers. The oscillator frequency is inversely proportional to the resistance of the DAC, where step size ranges between 0.05% and 0.1% of the frequency.

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).
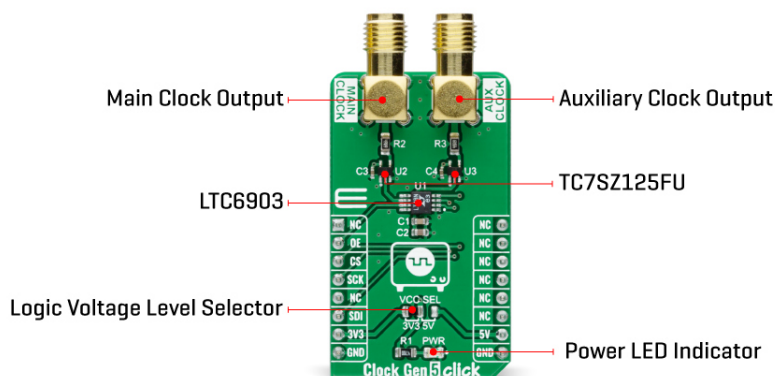
In the most frequency ranges, the output of the Clock Gen 5 Click is generated as a division of the higher internal clock frequency. This helps to minimize jitter and sub-harmonics at the output of the device. In the highest frequency ranges, the division ratio is reduced, which will result in greater cycle-to-cycle jitter as well as spurs at the internal sampling frequency. The output clock signals, available on the SMA connectors with an impedance of 50Ω labeled as MAIN and AUX CLOCK, before the output itself are primarily conducted through the TC7SZ125FU, a 3-state bus buffer allowing the LTC6903 to operate normally producing the required output.

Clock Gen 5 Click communicates with MCU using the 3-Wire SPI serial interface and operates at a clock frequency up to 20 MHz. The output signals are controlled by the output control bits MODE1 and MODE0, where the outputs can be disabled through these bits. When both output signals are disabled through the mode control bits, the internal oscillator is also disabled. The OE pin, routed on the RST pin of the mikroBUS™ socket, can also be used to asynchronously disable either output without shutting down the oscillator entirely.

This Click board™ is designed to operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows for both 3.3V and 5V capable MCUs to use the SPI communication lines properly. However, the Click board™ comes equipped with a library that contains functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Clock generator
Applications	Can be used for applications such as MCU clock source, clock source for a switched capacitor filter, or general replacement for a DAC/VCO combination
On-board modules	LTC6903 - a low-power self-contained digital frequency source providing a precision frequency from 1kHz to 68MHz set through a 3-wire digital interface from Analog Devices.
Key Features	Low power consumption, more reliable and vastly more versatile clocking solution, precision frequency from 1kHz to 68MHz,

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	proprietary feedback loop, and more.
Interface	SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Clock Gen 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
	NC	1	AN	PWM	16	NC	
Asynchronous Enable	OE	2	RST	INT	15	NC	
SPI Chip Select	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
	NC	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

Clock Gen 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Frequency Range	0.001	-	68	MHz
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Clock Gen 5 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.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on mikroE github account.

Library Description

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The library covers all the necessary functions to control Clock Gen 5 Click board™. Library performs a standard SPI interface communication.

Key functions:

- void clockgen5_out_enable (uint8_t en_out) - Enable output function.
- void clockgen5_set_config (uint8_t cfg) - Set configuration function.
- void clockgen5_set_freq (float freq) - Set frequency function.

Examples description

The application is composed of three sections :

- System Initialization - Initializes SPI, set RST and CS pin as outputs, begins to write log.
- Application Initialization - Initialization driver enables - SPI, set output configuration CLK + 180°, also write log.
- Application Task - (code snippet) This is an example that demonstrates the use of the Clock Gen 5 Click board™. In this example, we adjusts different frequencies every 3 sec. Results are being sent to the Usart Terminal where you can track their changes.

The full application code, and ready to use projects can be found on our LibStock page.

Other mikroE Libraries used in the example:

- SPI
- UART

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. 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.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

Downloads

[Clock Gen 5 click schematic](#)

[TC7SZ125FU datasheet](#)

[Clock Gen 5 click 2D and 3D files](#)

[Clock Gen 5 click example on Libstock](#)