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GainAMP click

PID: MIKROE-2555

Weight: 25 g

GainAMP click carries the LTC®6912 dual channel, low noise, digitally programmable gain amplifier (PGA). The click is designed to work on either 3.3V or 5V power supply. It communicates with the target MCU over SPI interface, with additional functionality provided by the following pins on the mikroBUS™ line: AN, RST.

GainAMP click also features three pairs of screw terminals and a power indication LED.

How it works

The gains for both channels are independently programmable, using a 3-wire SPI interface to select voltage gains of **0, 1, 2, 5, 10, 20, 50, and 100V/V** (LTC6912-1). All gains are inverting.

The LTC®6912 consists of 2 matched amplifiers with rail-to-rail outputs. When operated with unity gain, they will also process rail-to-rail input signals.

A half-supply reference generated internally at the AGND pin supports single power supply applications. Operating from single or split supplies from 2.7V to 10.5V total.

Programmable gain amplifier

A programmable-gain amplifier (PGA) is an electronic amplifier whose gain can be controlled externally (by analog or digital signals).

Key features

- LTC®6912 gain amplifier
  - 2 Channels with Independent Gain Control
  - 3-Wire SPI Interface
  - Extended Gain-Bandwidth at High Gains
  - Rail-to-Rail Input Range
  - Rail-to-Rail Output Swing
  - Single or Dual Supply: 2.7V to 10.5V Total
- Screw terminals for input and output
- SPI interface
- 3.3V or 5V power supply

Specification

Product Type	Amplifier
Applications	Data Acquisition Systems, Dynamic Gain Changing, Automatic Ranging Circuits, Automatic Gain Control.
MCU	LTC®6912 dual channel gain amplifier
Key Features	Rail-to-Rail Output Swing, Rail-to-Rail Input Range, 2 Channels with Independent Gain Control, Three pairs of screw terminals, 3-wire SPI interface
Interface	SPI
Power Supply	3.3V or 5V
Compatibility	mikroBUS
Click board size	S (28.6 x 25.4 mm)

Pinout diagram

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

Notes	Pin	mikroBUS™				Pin	Notes
Analog input	**AN_IN**	**1**	AN	PWM	**16**	NC	Not connected
Shut down	**SHDN**	**2**	RST	INT	**15**	NC	Not connected
Chip select	**SPI_CS**	**3**	CS	TX	**14**	NC	Not connected
SPI Clock Input	**SPI_CLK**	**4**	SCK	RX	**13**	NC	Not connected
Not connected	NC	**5**	MISO	SCL	**12**	NC	Not connected
SPI Master Output Slave Input	**SPI_MOSI**	**6**	MOSI	SDA	**11**	NC	Not connected
Power supply	**+3.3V**	**7**	3.3V	5V	**10**	**+5V**	Power supply
Ground	**GND**	**8**	GND	GND	**9**	**GND**	Ground

Maximum ratings

Description	Min	Typ	Max	Unit
Total Supply Voltage (V+ to V–)			11V	V
Input Current		±10		mA
Operating Temperature Range	–40°C		85°C	

Jumpers and settings

Designator	Name	Default Position	Default Option	Description
JP1	AN_sel	ON	AN	Analog input jumper.
JP2	V+	Left	VCC	V+ selection.
JP3	V-	Left	GND	V- selection.

Programming

Code examples for GainAMP click, written for MikroElektronika hardware and compilers are available on Libstock.

The gains for both channels are independently programmable using an SPI interface to select voltage gains. The example controls channel A, increasing and decreasing gain with input buttons.

Code snippet

The code snippet demonstrates a simple usage of the helper function.

```
01 void main()
02 {
03     system_init();
04
05     gain_amp_set(GAIN_AMP_NOMINAL_0, GAIN_AMP_SW_SHUTDOWN);
06
07     while( 1 )
08     {
09         if(Button(&GPIOE_IDR, 9, 100, 1))
10         {
11             byte = gain_amp_set(++gain & 0x07, GAIN_AMP_SW_SHUTDOWN);
12             GPIOD_ODR = (GPIOD_ODR & 0xFF00) | byte;
13         }
14         if(Button(&GPIOE_IDR, 8, 100, 1))
15         {
16             byte = gain_amp_set(--gain & 0x07, GAIN_AMP_SW_SHUTDOWN);
17             GPIOD_ODR = (GPIOD_ODR & 0xFF00) | byte;
18         }
19     }
20 }
```