



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