Voltmeter click

Voltmeter click is a mikroBUS™ add-on board for measuring voltage in an external electric circuit.

The board is designed to measure Direct Current only, and has a measurement range from 0 to 24V (it's possible to measure both positive and negative charges).

The design of the board is based on an OpAmp set up as a differential amplifier with a buffered input.

Two onboard screw terminals (probe+ and probe-) are bringing in the current, which then flows through a row of four resistors. A voltage – proportional to the input charge – is generated across the last two resistors. From there it is sent to the differential amplifier that further intensifies the difference between the two inputs (+/-).

The resulting charge is exactly 33 times lower than the actual measured voltage. It is converted by an onboard 12-bit ADC before being outputted through the mikroBUS™ SPI interface (the firmware in the target board MCU should be set up to multiply the ADC value to get the actual voltage). It is also possible to output the analog value directly through the mikroBUS™ AN pin (useful if the target MCU has a higher resolution ADC).

The board can work with either a 3.3V or a 5V power supply.

Technical Specifications

Applications

Measuring DC Voltage from external circuit

Key features

Measurement range: 0-24Vdc
12-bit ADC
SPI interface (+ AN pin)
3.3V or 5V power supply

Key Benefits

Measures both positive and negative charges
Possible to measure analog values directly
Works in all mikroC compilers
Ready-to-use examples save development time

mikroBUS™ is specially designed pinout standard with SPI, I2C, Analog, UART, Interrupt, PWM, Reset and Power supply pins. See Standard Specification.

Programming

The following code snippet shows how to send temperature readings from Voltmeter click to a TFT display. .

```
1 void system_setup( void );
2 unsigned int getADC( void );
3
4 void main()
5 {
6   system_setup();
7
8   while (1)
9   {
10
11     voltage = 0;
12
13     measurement = getADC() / 2;    // Get ADC result
14     voltage = (measurement - calibration) * 33.3405;
15
16     FloatToStr(voltage, txt);
17
```

```
18    UART1_Write_Text(txt);
19    UART1_Write(32);
20    UART1_Write_Text("mV");
21    UART1_Write(13);
22    UART1_Write(10);
23
24    delay_ms(1000);
25  }
26 }
27
28 void system_setup( void )
29 {
30   GPIO_Digital_Output( &GPIOD_BASE, _GPIO_PINMASK_13 );
31
32   UART1_Init(9600);            // Initialize UART module at 9600 bps
33   Delay_ms(300);               // Wait for UART module to stabilize
34   UART1_Write_Text( "UART Initialized\r\n" );
35
36   voltage = 0;
37   sum = 0;
38   measurement = 0;
39   calibration = 0;
40
41   Chip_Select = 1;
42
43   // SPI
44   SPI3_Init_Advanced( _SPI_FPCLK_DIV16, _SPI_MASTER | _SPI_8_BIT |
45                _SPI_CLK_IDLE_LOW | _SPI_SECOND_CLK_EDGE_TRANSITION |
46                _SPI_MSB_FIRST | _SPI_SS_DISABLE | _SPI_SSM_ENABLE |
47                _SPI_SSI_1, &_GPIO_MODULE_SPI3_PC10_11_12 );
48   Delay_ms(300);
49   UART1_Write_Text( "SPI Initialized\r\n" );
50
51   calibration = getADC() / 2;
52 }
```

Code examples that demonstrate the usage of Voltmeter click with MikroElektronika hardware, written for mikroC for ARM, AVR, dsPIC, FT90x, PIC and PIC32 are available on Libstock.

MIKROE-2436
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