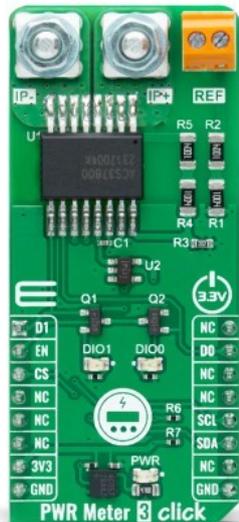


## PWR Meter 3 Click



PID: MIKROE-6257

PWR Meter 3 Click is a compact add-on board that measures voltage and current through the connected load. This board features the ACS37800KMCTR-030B3-I2C, an I2C-configurable power monitoring solution from Allegro Microsystems, which simplifies the addition of power monitoring to many AC/DC powered systems. The ACS37800KMCTR-030B3-I2C's Hall-effect-based current sensing technology achieves reinforced isolation ratings (4800 VRMS) alongside a reliable  $\pm 30A$  bidirectional current sensing. It also has two LED indicators for the realization of visual detection of some anomalies in operation, such as under/overvoltage and fast overcurrent fault detection. This Click board™ is suitable for many monitoring applications, such as power metering in information and communication equipment, embedded electronic applications, and similar.

**DO NOT TOUCH THE BOARD WHILE THE LOAD IS CONNECTED!**

**Note:** This Click board™ needs to be used by trained personnel only while applying high voltages. Special care should be taken when working with hazardous voltage levels.

### How does it work?

PWR Meter 3 Click is based on the ACS37800KMCTR-030B3-I2C, a simple solution for voltage, current, and power monitoring from Allegro Microsystems, which simplifies the addition of power monitoring in 60Hz to many AC/DC applications. The ACS37800KMCTR-030B3-I2C

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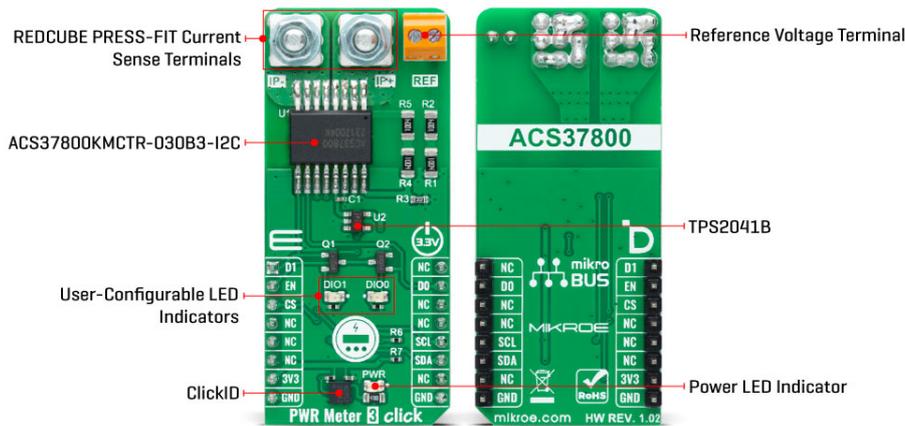


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includes a copper conduction path that generates a magnetic field proportional to the applied current, sensed differentially to reject errors introduced by common mode fields. It is particularly well suited for high isolation, achieving reinforced isolation ratings of 4800VRMS and a reliable bidirectional current sensing range ( $\pm 15A/\pm 30A/\pm 60A$ ). With high configurability and integrated features, this Click board™ can fit most power monitoring applications.



The ACS37800KMCTR-030B3-I2C measures the voltage applied to the REF terminal, in the range from 9.5 to 27V, by resistor dividing it down to fit the input range of the onboard voltage sense amplifier and add isolation. On the other hand, the current applied to the current sensing terminals is measured using the integrated current loop and galvanically isolated Hall sensor. Both analog signals are then sampled using integrated high-accuracy ADCs before entering the digital system. The metrology engine later determines the frequency, calculates RMS values of current, voltage, and power, and provides a range of averaging and configuration options.

PWR Meter 3 Click communicates with an MCU using the standard I2C 2-Wire interface to read data and configure settings, supporting Standard Mode operation with a clock frequency of 100kHz and Fast Mode up to 400kHz. The ACS37800KMCTR-030B3-I2C can be enabled or disabled through the EN pin routed to the RST pin of the mikroBUS™ socket, hence, offering a switch operation to turn ON/OFF power delivery to the ACS37800KMCTR-030B3-I2C via TPS2041B.

Along with the ability to measure current and voltage, it also has two LED indicators, DIO0 and DIO1, for the realization of visual detection of some anomalies in operation, such as undervoltage and overvoltage reporting, and fast overcurrent fault detection. The DIO0 LED default state application is for zero crossing, while DIO1 stands for overcurrent detection. In addition to the LEDs, this information can also be detected through the INT and AN pins of the mikroBUS™ socket, marked as D0 and D1.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used as a reference for further development.

## Specifications

Type	Measurements
Applications	Can be used for power metering in information

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	and communication equipment, embedded electronic applications, and more
On-board modules	ACS37800KMCTR-030B3-I2C - power monitoring solution from Allegro Microsystems
Key Features	High accuracy power monitoring for AC and DC applications, certified for high reinforced isolation, Hall-effect based, anomaly detection, I2C interface, user-programmable thresholds, and more
Interface	I2C
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

## Pinout diagram

This table shows how the pinout on PWR Meter 3 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Overcurrent Fault	<b>D1</b>	1	AN	PWM	16	NC	
Device Enable	<b>EN</b>	2	RST	INT	15	<b>D0</b>	Zero Crossing
ID COMM	<b>CS</b>	3	CS	RX	14	NC	
		4	SCK	TX	13	NC	
		5	MISO	SCL	12	<b>SCL</b>	I2C Clock
		6	MOSI	SDA	11	<b>SDA</b>	I2C Data
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	NC	
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	DIO1	-	User-Configurable LED Indicator
LD3	DIO0	-	User-Configurable LED Indicator

## PWR Meter 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Voltage Reference Range	9.5	-	27	V
Operating Current Range - 15A	-15	-	+15	A
Operating Current Range - 30A	-30	-	+30	A
Operating Current Range - 60A	-60	-	+60	A

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Sensitivity	-	916.7	-	LSB/A
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## Software Support

[PWR Meter 3 Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

## Example Description

This example demonstrates the use of PWR Meter 3 Click board by reading and displaying the voltage, current, and power RMS measurements.

### Key Functions

- `pwrmeter3_cfg_setup` Config Object Initialization function.
- `pwrmeter3_init` Initialization function.
- `pwrmeter3_default_cfg` Click Default Configuration function.
- `pwrmeter3_get_dio0_pin` This function returns the DIO0 pin logic state.
- `pwrmeter3_get_dio1_pin` This function returns the DIO1 pin logic state.
- `pwrmeter3_read_average_rms` This function reads the voltage and current RMS measurements averaged from a specified number of samples.

### Application Init

Initializes the driver and performs the Click default configuration which sets the DC measurement and VRMS thresholds to about 28V for overvoltage and about 9.3V for undervoltage flag.

### Application Task

Reads the voltage and current RMS values averaged from 500 samples, then calculates the power from it and displays the results on the USB UART. Also if an UV or OV flag is detected it will be logged accordingly.

## Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

## Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

## Resources

### [mikroBUS™](#)

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[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[ACS37800 datasheet](#)

[PWR Meter 3 click 2D and 3D files v102](#)

[PWR Meter 3 click example package](#)

[PWR Meter 3 click schematic v102](#)

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