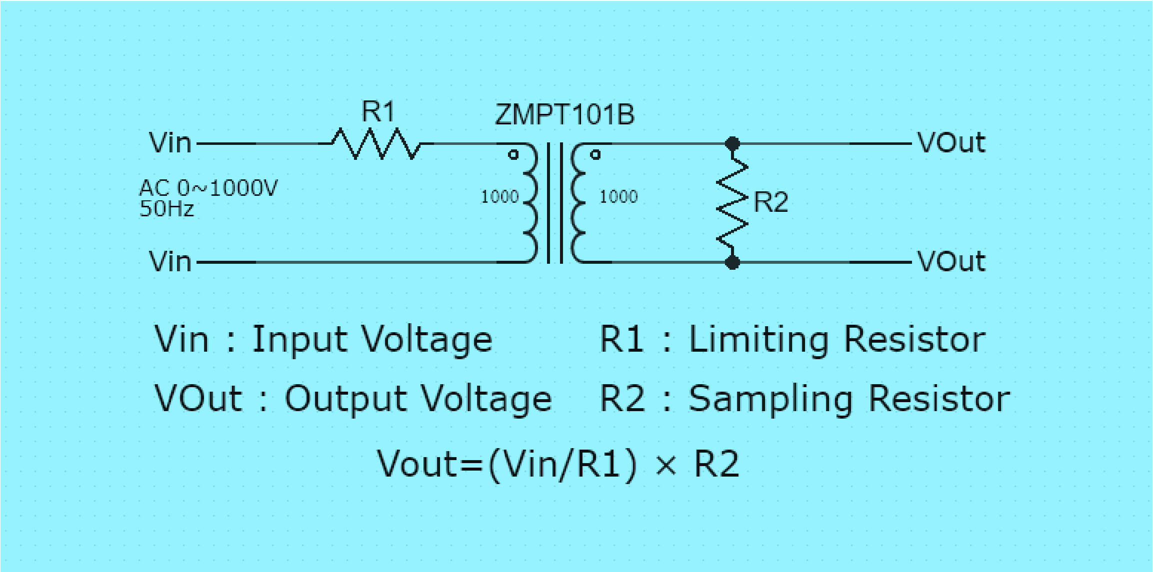
ZMPT101B

MICRO PRECISION VOLTAGE TRANSFORMERS

ZMPT101B schematic/ Wiring Diagram



Description

ZMPT101B AC Voltage Sensor is the best for the purpose of the DIY project, where we need to measure the accurate AC voltage with voltage transformer. ZMPT101B is an ideal choice to measure the AC voltage using Arduino/ESP8266/Raspberry Pi like an opensource platform. In many electrical projects, engineer directly deals with measurements with few basic requirements like

- High galvanic isolation
- Wide Range
- High accuracy
- Good Consistency

ZMPT101B is a high precision voltage Transformer. This module makes it easy to monitor AC mains voltage upto 1000 volts. A tiny little thing the size of a bouillon cube. Holds up

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to 4kV per breakdown voltage, the ratio of turns is 1: 1, but this is a current transformer of 2mA: 2mA. That is, we feed it a current and remove the current. The input current is simply set by the resistor in series R1, and a sampling resistor R2 is used in parallel to obtain the output voltage.

ZMPT101B Calculation

R1 is chosen so that the current through the winding does not exceed 2mA, it holds a maximum of 10mA, but after 2mA linearity is lost and the output will be clear that.

Step 1: Determination of maximum output rms voltage

VOutmax is decided by the ADC peak voltage in the sampling loop of Microcontroller.

For Bipolar ADC

$\text{VOutmax} = \frac{Peak\ Voltage}{\sqrt{2}}$ For example

As for ± 5V ADC, the maximum rms voltage of the transformer:

$$\text{VOutmax} = \frac{Peak\ Voltage}{\sqrt{2}} = \frac{5V}{\sqrt{2}} = 3.53V$$

For Unipolar ADC

$$\text{VOutmax} = \frac{Peak\ Voltage}{2\sqrt{2}}$$

For example

As for 0-3.3V ADC, the maximum rms voltage of the transformer:

$$\text{VOutmax} = \frac{Peak\ Voltage}{2\sqrt{2}} = \frac{3.3V}{2\sqrt{2}} = 1.16V$$

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Step 2: Determination of input current-limiting resistor R1

Current-limiting resistor

$$R1 = \frac{Vin}{I}$$

Where

Vin：Rated input voltage

I ： Rated operating current （when Coil resistance is compared with current-limiting resistor R1, it can be ignored.）

ZMPT101B usually working at rated current**: 1~2mA.**

When Rated input voltage ≤ 100V ， Usually choosing the operating current I=2mA; When Rated input voltage ≥ 220V， To reducing the resistor power， usually choosing the operating current **1 mA ≤ I ≤ 2 mA**.

for example: V=100V， I=2 mA,

$$R1 = \frac{Vin}{I} = \frac{100}{0.002} = 50k\Omega$$

for example: V=220V， I=1.1 mA,

$$R1 = \frac{Vin}{I} = \frac{220}{0.0011} = 200k\Omega$$

To improve reliability, the current-limiting resistor selected usually is greater than its 4times the rated power, and generally use a high temperature coefficient metal film resistor.

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Step 3: Determination of the sampling resistor R2

$$R2 = \frac{VOutmax}{I} = \frac{VOutmax}{Vin} \times R1\ \ \Omega$$

for example: Voutmax =3.53V， Vin =100V

$$R2 = \frac{VOutmax}{I} = \frac{VOutmax}{Vin} \times R1 = \frac{3.53}{100} \times 50\ k\Omega = 1.765k\Omega$$

- Above formula is also suitable for the two ways of active and passive output.
- When selecting the sampling resistor, Resistor should not exceed

$$R2 = \frac{VOutmax}{I} = \frac{VOutmax}{Vin} \times R1\ \ \Omega$$

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