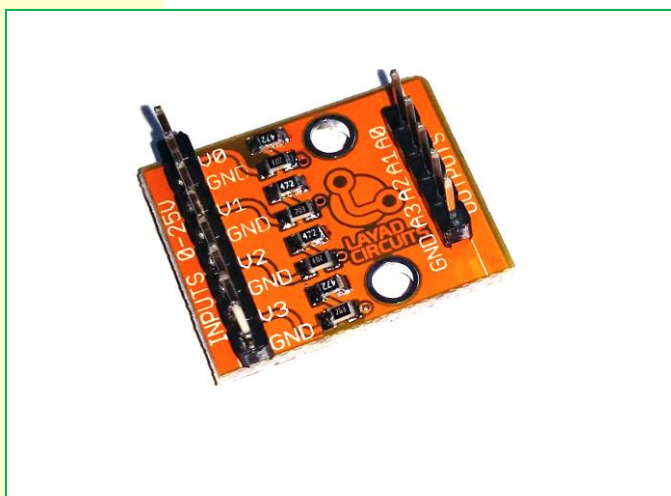


**DESCRIPTION**

The Kimat – Voltage Sensor module is a 4 channel voltage divider network for sensing of voltages from 0V-24V (for 5V controllers) via ADC. This simple circuit aims to facilitate quick and hassle-free implementation of direct reading of voltages over the I/O voltage limit of ADC’s by scaling the input voltages with resistors without soldering.

The Kimat – Voltage Sensor is part of Layad Circuits’ Kimat series of rapid prototyping products.



**PIN FUNCTIONS**

**Input Header**

Connect the voltages under test using this header.

Pin Label	Function/Operation/Remarks
V0,V1,V2,V3	Pins for the voltages under test. Each channel may measure up to 24V for 5V ADC inputs. For 3.3V devices, limit to 17V.
GND	Ground pin. Each channel has a GND pin

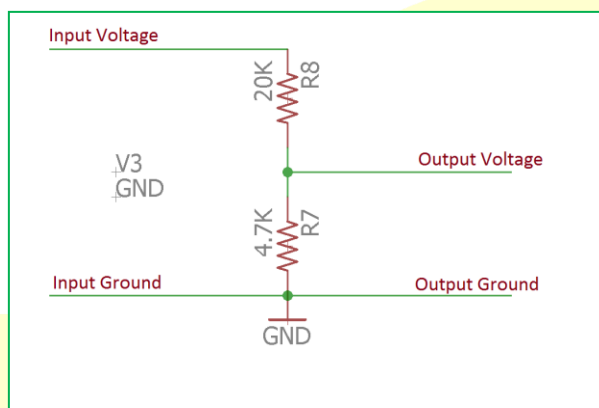
**Output Header**

This header connects to the ADC inputs of the host microcontroller.

Pin Label	Function/Operation/Remarks
A0,A1,A2,A3	Scaled down voltage from the input voltage. The voltage at this pin is equivalent to 0.19028 x the input voltage.
GND	Ground pin. Connect to MCU ground

**SCHEMATIC**

This module employs 4 identical circuits of the schematic below:



**FEATURES**

- 4 channel voltage divider network
- Measure up to 24V per channel for 5V microcontrollers.
- Compact form factor , board dimensions: 25x20mm
- Standard 2.54mm pitch headers.
- Less than 4.5mA maximum current consumption

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## APPLICATION NOTES

The Kimat-Voltage Sensor module is nothing more than 4 voltage divider networks with input and output headers. Any input voltage is scaled down by a factor of 47/247 to facilitate safe measurement of voltages. The module was created for use with the ADC of microcontrollers. While the circuit may be simple, implementing up to four channels may be time consuming. Hence, this module was created for the quick implementation of up to 4 voltage sensing channels for ADC's.

## Wiring

V0~V3 connects to the voltage under test. The voltages must have a common ground with the host ADC so 4 GND pins are provided for that. The following diagram shows the module used with an Arduino/Saleng Uno:

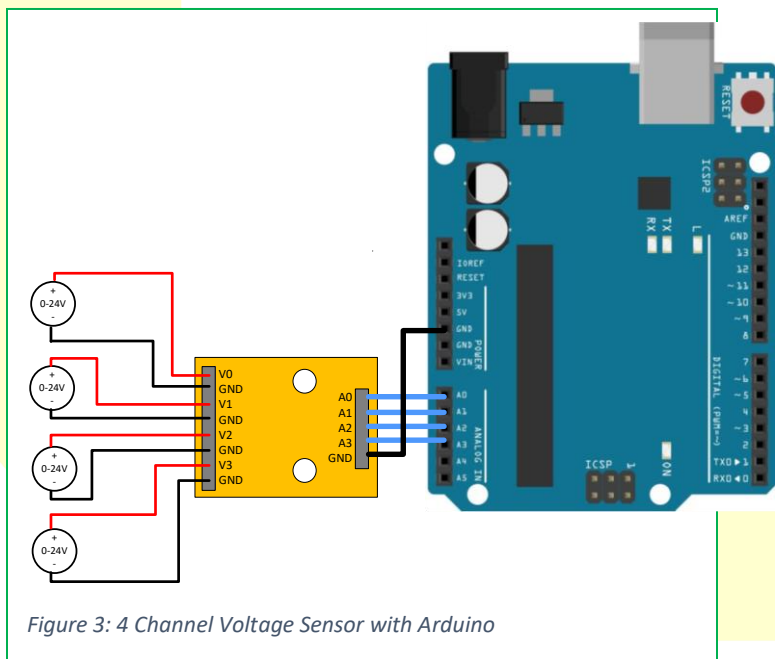


Figure 3: 4 Channel Voltage Sensor with Arduino

## Example Arduino Code

The following Arduino sketch displays the voltage as seen from each channel. This follows the wiring in figure 3.

```
float adc2volts(unsigned int adc)
{
  float r1 = 20000;
  float r2 = 4700;
  return (((float)(adc*5))/1024.0) * (r1+r2) / r2;
}

void setup() {
  Serial.begin(9600);
}

void loop() {
  Serial.print(adc2volts(analogRead(A0)));
  Serial.print(", ");
  Serial.print(adc2volts(analogRead(A1)));
  Serial.print(", ");
  Serial.print(adc2volts(analogRead(A2)));
  Serial.print(", ");
  Serial.print(adc2volts(analogRead(A3)));
  Serial.println();
  delay(100);
}
```

The results may be viewed from the Serial Monitor with baud rate set to 9600. Or for a visual representation of those voltages, use the Serial Plotter and have a simple 4-channel oscilloscope-like device.

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