# IP voltmeter v2.5

Overview

IP voltmeter v2.5 is a universal device for measuring DC voltage over the Internet.

The board is capable of measuring voltage levels in the range of 0-100V DC with a resolution of 16 bits (0.01 V), providing accurate and reliable measurements for a variety of applications.

 IP Voltmeter contains 8 analog inputs which are galvanically isolated and completely independent of each other.
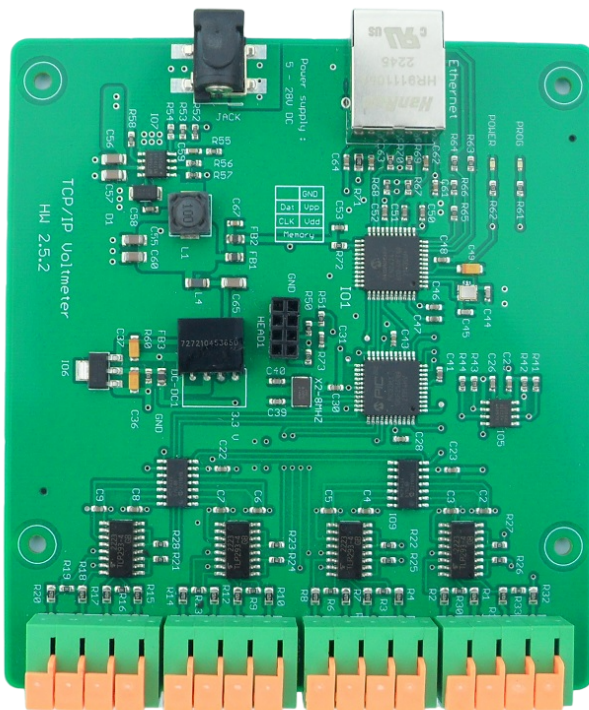
Technical specifications

Board size : 118 x 107 mm
Board supply voltage : + 5V to + 28V DC
Board current consumption : 77 mA / 12 V

Voltmeter measurig range : 0 - 100 V DC (both polarity +/-)
Voltmeter resolution : 0.01 V
Voltmeter input impedance : 1 MOhm
Voltmeter speed measurement : 2 times/sec

Block diagram

The board contains a 3.3V power supply that powers the entire board. Then the processor, Ethernet controller, optocoupler and 2 A/D converters.

The A/D converters are galvanically isolated from the board and the individual channels are also isolated from each other. This solution allows to use the board in various applications without grounding problems.
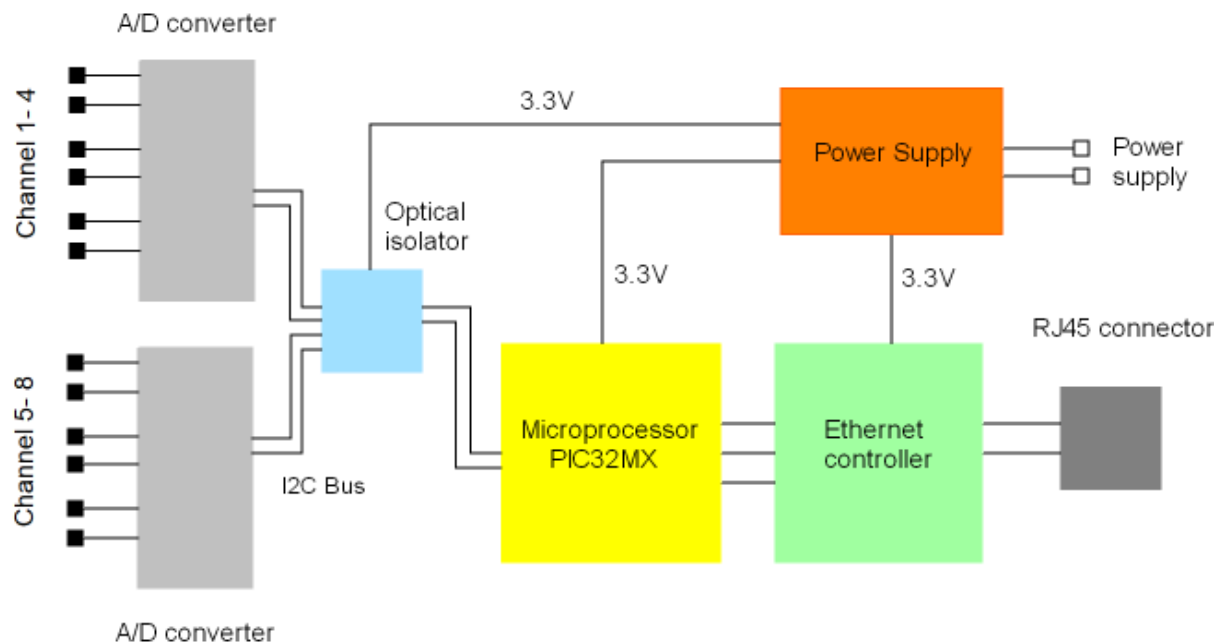
Reading data from TCP/IP voltmeter

You can read the measured values from TCP/IP voltmeter in different ways :

Using web browser
Using TCP client
With SNMP client
Reading XML file directly

Web browser. Using web browser is a simple way to read data from TCP/IP voltmeter. You can use any web browser. Web browser must support AJAX technology. Data are transmitted to the web browser in the XML file that is reading by javascript.

TCP client. TCP/IP voltmeter works as TCP server and listens on port 9760. You can read data from the TCP/IP voltmeter with any TCP client. This means voltage and current. This

port is hard-coded and can not be changed. Source code for TCP client is in software package.

SNMP client. TCP/IP voltmeter includes an SNMP agent, so you can use any SNMP client to control all functions of TCP/IP voltmeters. This version supports SNMP v2 version.

Reading XML file directly. When TCP/IP voltmeter communicates with web browsers, it sends him Status.xml file. His address is http://your_ip_address/status.xml. You can read this xml subfile and parse the measured values. The xml subfile looks like this:

```
<response>
   <v1>0.00</v1>
   <v2>0.00</v2>
   <v3>0.00</v3>
   <v4>0.00</v4>
   <v5>0.00</v5>
   <v6>0.00</v6>
   <v7>0.00</v7>
   <v8>0.00</v8>
</response>
```

Network configuration and setup procedures

The IP voltmeter supports the following protocols: TCP/IP, UDP, HTTP. HTTPS is not supported. The IP voltmeter gets a dynamic IP address when connected to the network. How to find out this IP address is described in another document.

The IP address is obtained from the DHCP server. The board can also have a static IP address. This can be selected in Network settings.

To change the settings in Network settings you need a username and password. For this board the name is : **admin** and the password : **microchip**.

Default network settings are shown in the picture. Each board has a unique MAC address.

Start working with TCP/IP voltmeter

1. Connect ethernet cable to TCP/IP voltmeter.
2. Connect cables for voltmeter and ammeter to measuring device.
3. Connect the power supply.
4. Start web browser or other application.

When TCP/IP voltmeter is connected to the network and power is on, voltmeter will begin to send and receive packets. This is indicated by yellow and green LED diode. If both are blinking, then the voltmeter is working properly. POWER LED diode indicates that the power supply is connected. The PROG LED indicates that the processor is working.

To connect to the TCP/IP voltmeter, enter an address in the browser: **http://mchpboard** .

It is also possible to connect via IP address. You can check your local IP address with Microchip Ethernet Discover tool. This tool will show you your IP and MAC address. The procedure is described in another document.

IP voltmeter obtain dynamic IP address automatically when connected to the network (it includes DHCP client) or it may have a static IP address.

Main page
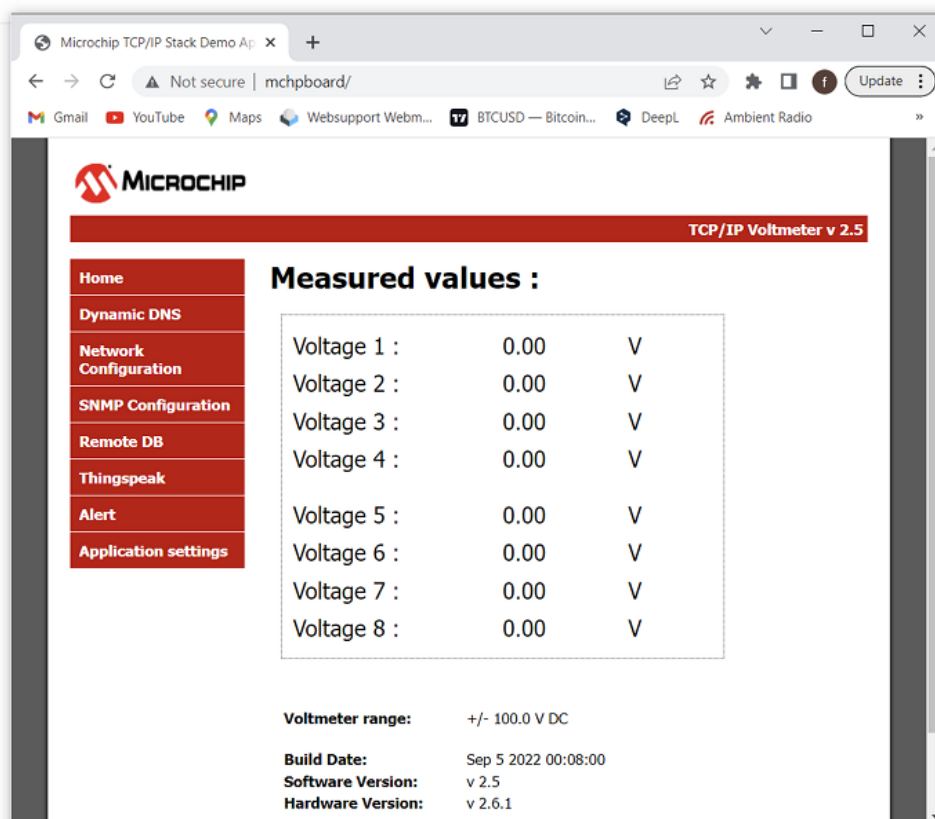
Reset board

If the settings in Network Settings have been changed and the board is not working properly, it is possible to reset the board and return it to its original settings.

To reset the board, follow these instructions:

1.disconnect the power supply
2. connect two points that are in the picture (red line)
3. turn on the power supply
4. wait minimal 5 secound
5. disconnect two points
6. the board is reset and operating in a original setting.
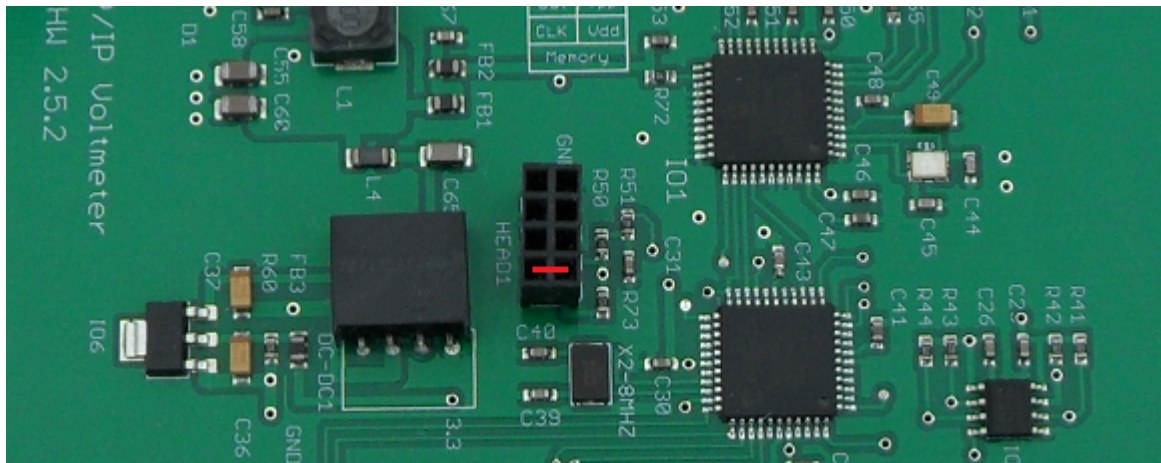
## Pinout diagram and electrical connections
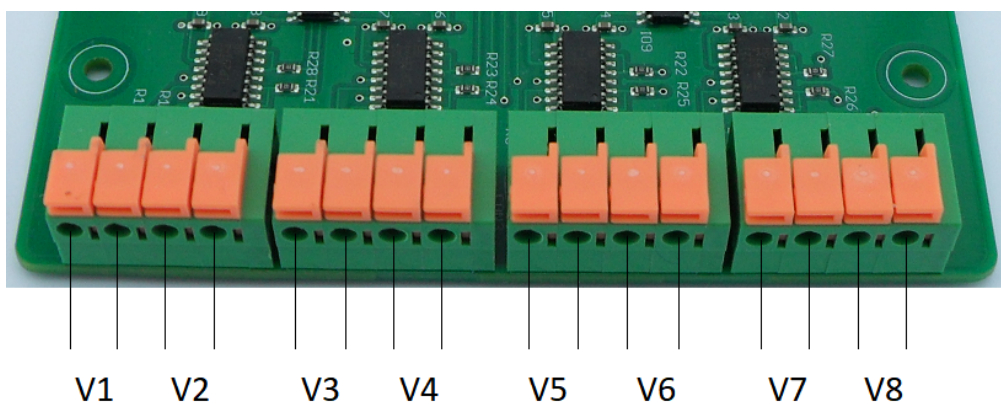
The wiring of the inputs is shown in the picture.

Power supply

IP voltmeter is designed for a wide range power supply. IP voltmeter is supplied by external source of +5 to +28 Volts DC. Current consumption is around 77 mA/12V. At higher supply voltages the current is smaller.

The board can be powered from an universal AC/DC power supply adapter or from batteries. The board can also be powered by a battery that is directly measured.

The power jack is 5.5 mm in diameter.
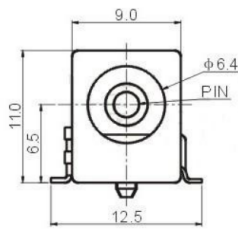
SMD DC-005 DC Power Jack Socket Connector 5.5*2.5mm

Use cases and applications of the voltage measurement

When connecting IP voltmeter to other devices, it's important to consider whether to use a common ground or a separate ground. A common ground means that all devices in the system share the same ground reference. This reduce the risk of ground loops, which can cause noise and interference in the signals.

A separate ground means that each device in the system has its own ground reference. This can help prevent ground faults but can also increase the risk of ground loops and signal interference.

Measured objects can be connected separately or with common ground. The input circuits of the board are designed in such a way that it is possible to measure both cases: **with a common ground or completely separate measured objects.**
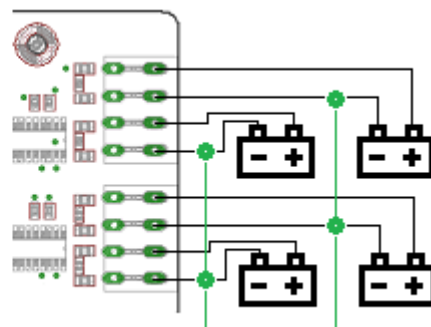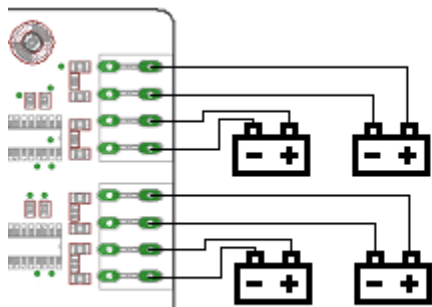
Advanced functions

The IP voltmeter also has additional functions :

- TCP server on port 9760
- SNMP v2
- Static and dynamic IP address
- Sending alert
- Sending data to remote database
- Sending data to cloud (Thingspeak)

These features are described in another document.