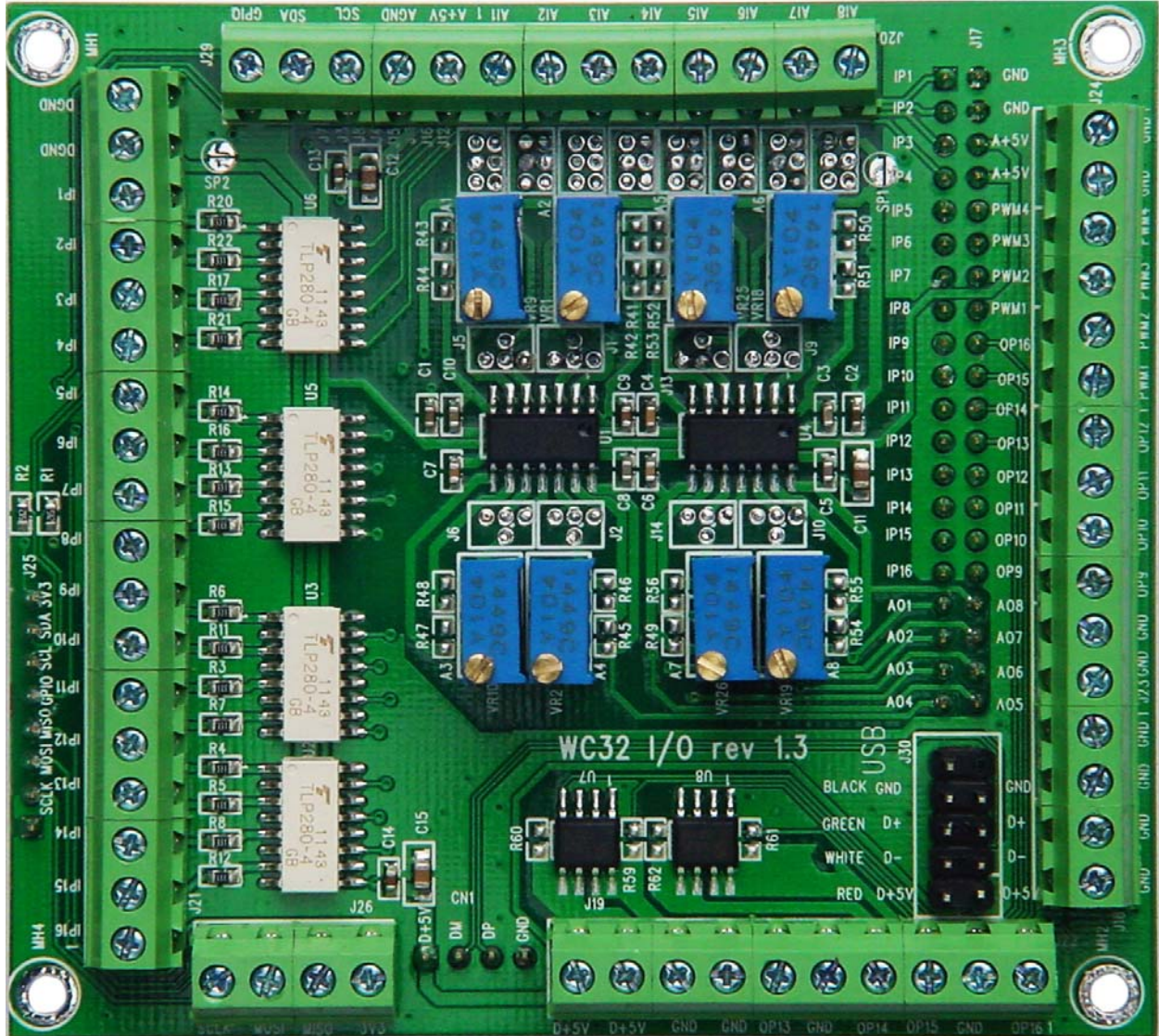


WC32 IO Expansion Board

rev 1.3



The WC32 I/O expansion board can directly fit on top of WC32 Processor board. It makes wiring easier and expands some functions of the WC32 processor board.

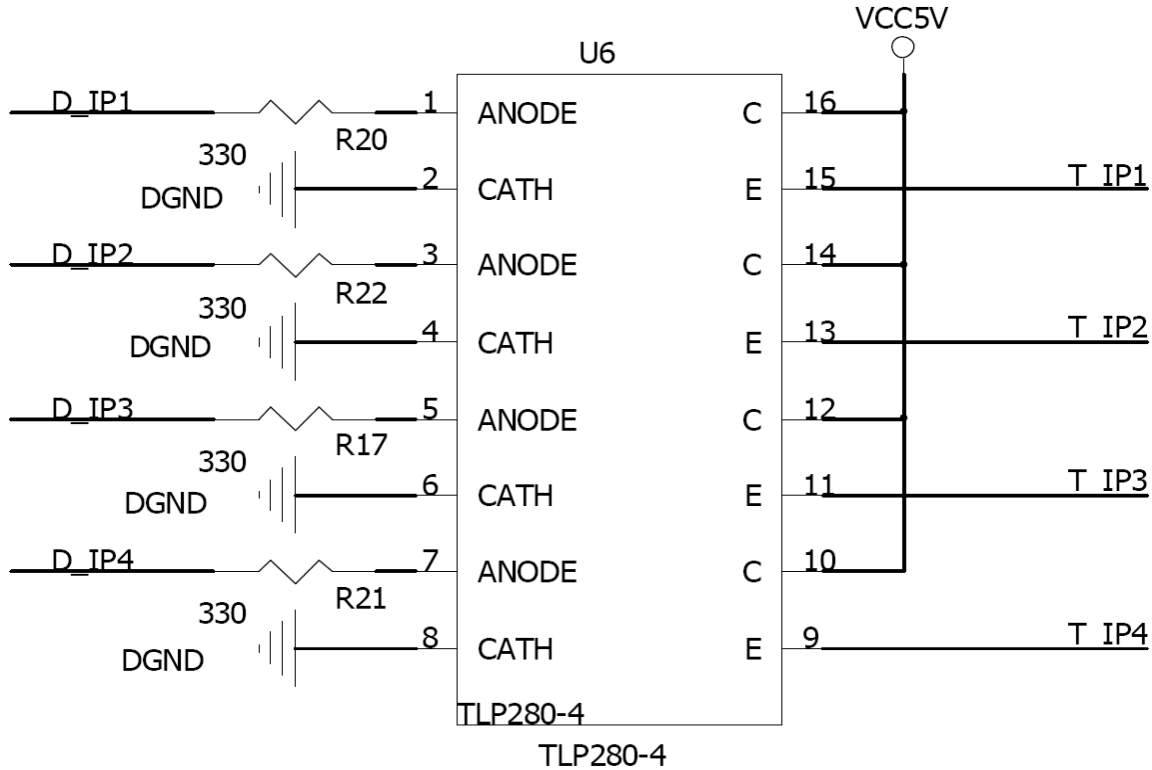
WC32 PLC Processor board supports 16 TTL input, 16 TTL output, 8 analog inputs, four channel of PWM output, I2C, SPI, and the USB ports. Only 8 TTL outputs have direct terminals on board.

This I/O expansion board can fit directly on top of WC32 PLC processor board. It provides screw terminals for most I/O features that are not provided on the PLC processor board.

This document provides the details discussion of this WC32 I/O Expansion board.

1 TTL Input

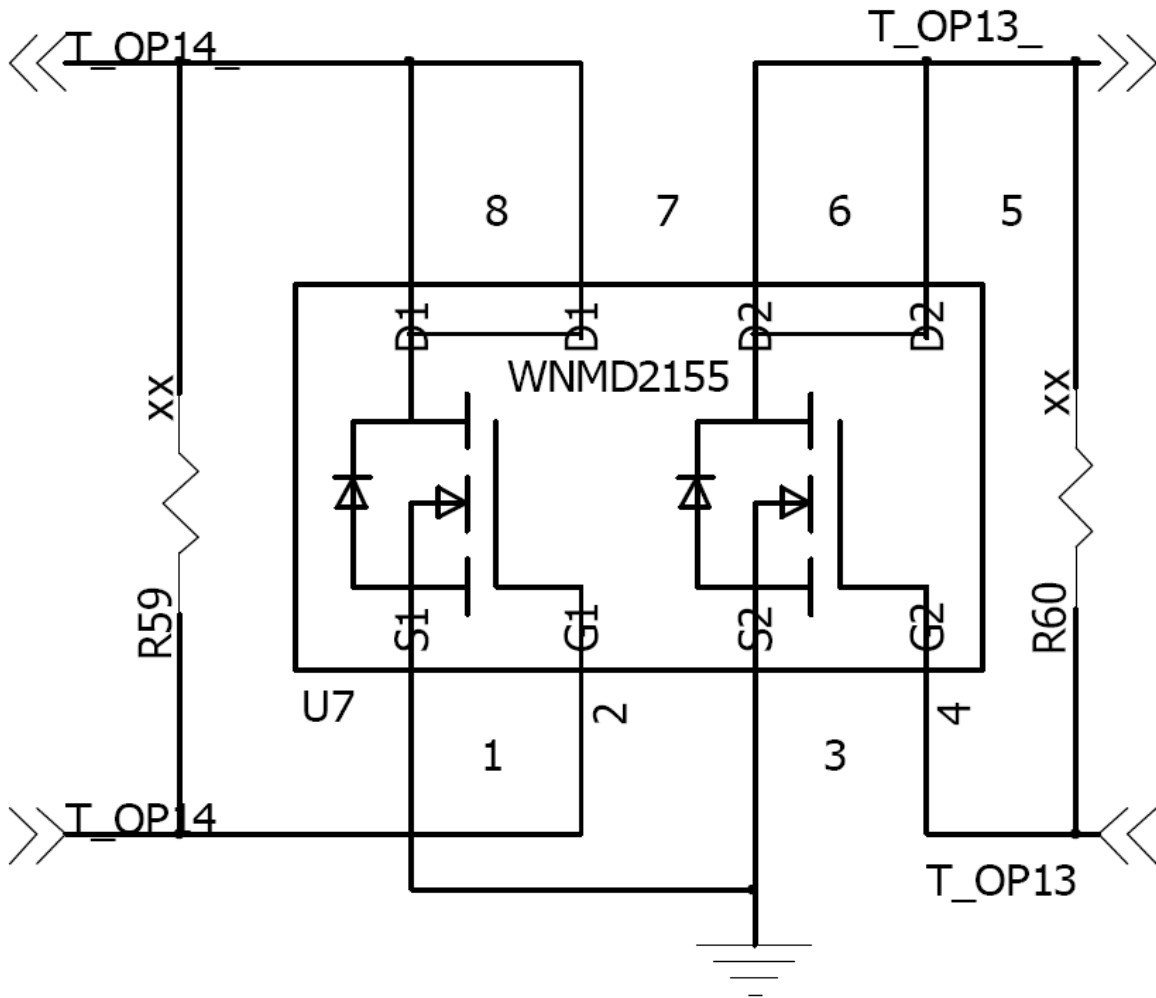
WC32 has 16 TTL input directly through a buffer IC connected to processor input pins. In a noisy environment, it can be a problem when electrical noise is too high, due to high impedance of the TTL input. The I/O expansion board adds optical isolation drivers on board, so that not only it helps filter the electrical noise from false triggering, it also enhances safety by totally isolating the TTL input from rest the circuit. By factory default, even TTL input ground in the front end is not connected to the processor ground. A portion of the TTL input circuit is shown below:



The input signal drives the optical isolator IC front end through a 330 Ohm resistor. DGND is not connected to the processor GND. When a common ground is required, a simple and convenient mechanism is included in the IO board. Using a soldering iron, bridging SP2 with a small amount of solder connects DGND and GND.

2 TTL output

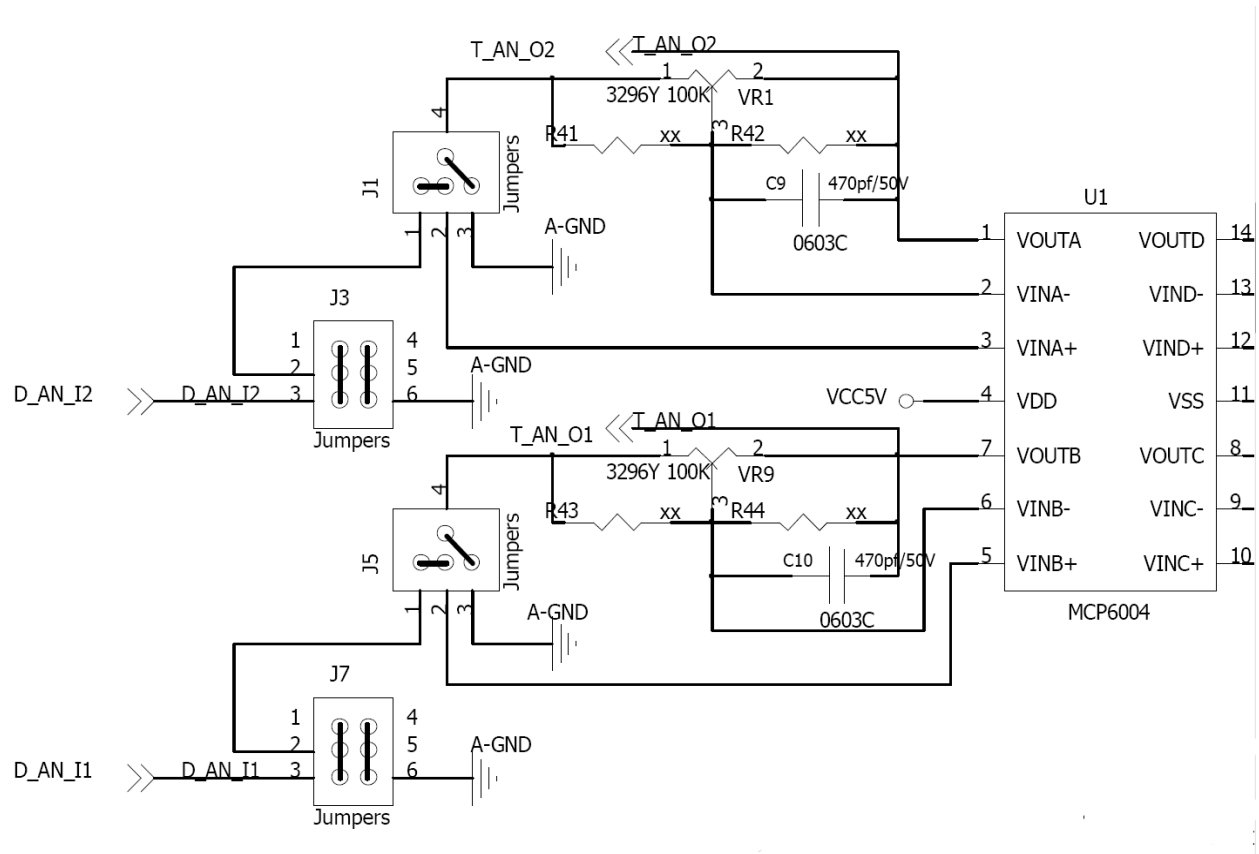
WC32 PLC processor board has 8 TTL output terminals. WC32 IO expansion boards provides another 8 TTL output terminals, to connect easily total 16 TTL outputs. TTL output 9 to output 12 are directly connected to terminals on the edge of the IO expansion board. TTL output 13 to output 16 are through power MOSFET connected to another edge of the IO expansion board. A portion of the power MOSFET circuit is shown below:



One can see that if power MOSFET is not needed, a short wire across R60 will directly connect TTL output 13 to the output 13 terminal. Similarly, R59, R61 and R62 for outputs 14, 15, and 16.

3 Analog Input

There are 8 analog inputs on the WC32 PLC board available through the 40 pin header. WC32 I/O expansion board not only provides screw terminals, but also adds amplifier and gain control 10 multiturn pot for each analog input. Below is part of the analog input circuitry:



XX value resistor indicates the resistor is not installed. Jumper blocks provide flexibility to configure each channel as an inverting or non-inverting amplifier. MCP6004 is a pico-amp low leakage analog amplifier chip, and can amplify even very weak analog signals.

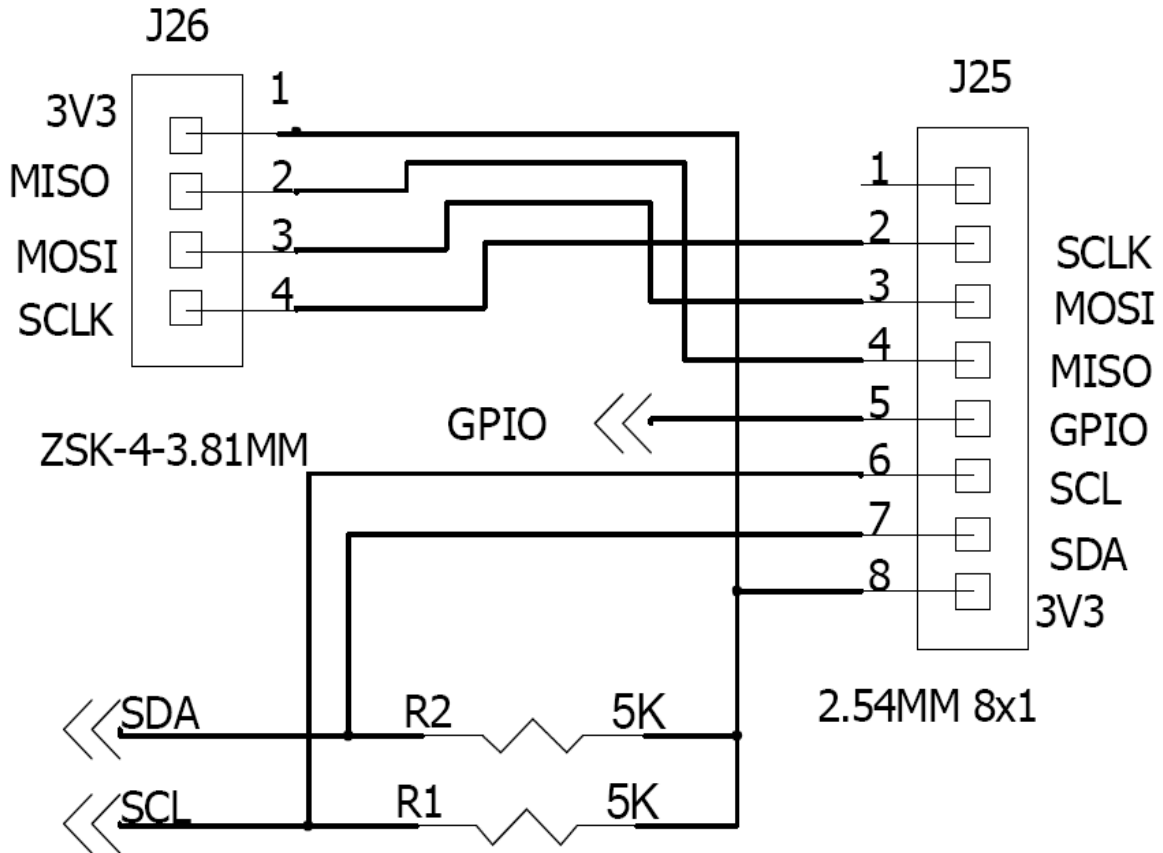
Unlike the WC8 PLC board, WC32 analog input is 5V full scale, which means 1023 indicates 5V analog input. In reality, with power supply to MCP6004 of 5V, the analog input may not quite reach the full 5V. There is no way to bypass amplifier, but gain control can change the range of analog signals.

By default, A-GND is not connected to D-GND. To connect them together, please solder SP1 pads together.

4 I2C and SPI Terminals

WC32 PLC board supports both I2C and SPI functions through PLC programming. However, its I2C and SPI connections are on an 8 pin header. This WC32 I/O expansion board adds pull-up resistors as well as provides screw terminals.

I2C and SPI circuitry is shown below:



In most cases, I2C chips are powered by 5V and SPI sensors are powered by 3.3V. I2C and SPI connectors are placed on two opposite side of the IO expansion board to avoid confusion.

5 USB Connector

There is a USB connector on the IO expansion board. It has same layout as general PC motherboard USB connector. A PC mother board USB ribbon cable can be used for providing regular USB socket. Please note that Only one USB port supported by WC32 board, both sides of the J30 are wired together. If a USB hub is connected, a powered hub is required.