UNIPORT V3

C R H Electronics Design



Uniport V3

USB powered Parallel port interconnection board with optical isolated inputs, buffered outputs, charge pump interlock and power relays

By C R Harding

Specification

- Optical isolation of all inputs.
- Four XYZA Axis buffered outputs to stepper control boards.
- Integrated Charge pump logic line protects all outputs.
- High current (30mA max) stepper drive outputs with charge pump interlock.
- LED status indicators for Power, Charge Pump, Relays 1&2.
- USB type B computer power socket
- Charge pump override jumper
- Mainly surface mount components for greater reliability.
- Board size 107 X 80 mm. FR4, 1oz copper, RoHS compliant.
- Two 16A, 240V AC control relays with single pole contacts.
- Optional Input power isolation.
- Alternative 5 volt input power connection.
- Only consumes 150mA with all relays activated.

Manual V3.0 June 13 Hardware V3.0 June 13

Introduction

As quite a few stepper driver boards now have built in optical isolation but need a reasonable amount of drive current, a product was needed to interface with these driver boards. The Uniport board addresses this problem by providing high current drive for all stepper signals with charge pump control for maximum protection and high frequency performance for very fine step rates. Four axis, step and direction signals are available and five inputs to the board which are optically isolated with optional power isolator. To simplify power requirements the whole board can be powered from a standard computer USB port or an external regulated 5 volt DC connection if available. For power switching motors, pumps etc the Uniport board is equipped with two 16 Amp power relays that also have charge pump interlock protection.

Description

The Uniport board is an optical isolated input parallel breakout board with the addition of a charge pump, power save circuits and relay control outputs. All stepper drive outputs are buffered with up to 30mA of drive current and a high frequency operation making them ideal to drive optically isolated stepper boards. Unlike the basic parallel brake-out boards the Uniport board has designated X, Y, Z & A motor control step and direction pins that will need to be matched in the user software. All these step and direction signals are actually treated the same way in hardware and can be made interchangeable if there is no software option. The chart fig1 gives the pinout reference used in the design. The Charge pump circuit uses the 12 KHz signal configured to pin one of the parallel port generated by the CNC software when the program is up and running correctly. The logic level obtained from this signal controls either an enable or sleep pin on the stepper motor drive board or boards. There is a charge pump override jumper J13. This can be used for test purposes or connected permanently if your software does not support a charge pump signal. The charge pump signal is gated into the buffer chips so that they are disabled without this signal present. This means that driver boards that have no enable signal pins are still made safe by having there input signals removed. This charge pump signal is also gated into all relay outputs so no false triggering of the relays can occur while the software is not running.

The Uniport board has five signal inputs each with its own series limiting resistor. The resistor value is set to give 5mA current through the device on a 5V supply. The input ports have their limiting resistors connected to the internal 5 volt supply but an optional DC/DC isolator option gives complete isolation.

Either way you can wire switches between input and ground with no external component needed.

Notes : The control software must have the charge pump signal set to pin1 and be present for the board to be enabled unless the override link is on.

Fig1		1
Parallel Port Pin	Uniport Output	Input/Output
1	Charge pump signal	Out
2	X Direction	Out
3	X Step	Out
4	Y Direction	Out
5	Y Step	Out
6	Z Direction	Out
7	Z Step	Out
8	A Direction (4 th Axis)	Out
9	A Step (4 th Axis)	Out
10	Input 1	(isolated) In
11	Input 2	(isolated) In
12	Input 3	(isolated) In
13	Input 4	(isolated) In
15	Input 5	(isolated) In
14	Output	Out (SP)
16	Relay1	Out (SP)
17	Relay2	Out (SP)
18-25 computer ground	Ground reference	

Connections

You will need two cables from your computer to the Uniport board. A standard parallel port 25 way male to female lead provides all the signal information. A standard USB A to B lead provides a 5 volt power supply for the Uniport board. Alternatively there is a 5 volt power connection available. This voltage must be a regulated 5V DC supply.

A system wiring setup to a stepper driver board is shown in Fig 3. Fig4 shows a simple limit switch serial circuit and emergency stop switch using two inputs to the Uniport board. All micro switches are normally closed connection. Configure controlling software to stop on change of input signal pin parallel port (11) and limit switches on pin (10). Other inputs could be used for home switches or separate banks of limit switches for each axis. The software manual usually describes these functions in more detail. Fig5 shows connecting relay output one to controlling spindle motor and relay two a coolant pump. The pump or motor is simply connected to the normally open connection RLYA and power applied to the RLYB common. Activating the relay closes the contacts completing the circuit. Utmost care should be taken handling the Uniport board when there are live mains connections connected to the PCB as the relay terminals are exposed on the underside of the board. It is better to bolt the board down to the case or a side panel with a small gap to stop fingers being inserted underneath.



Fig3 Connecting DRV30 to UNIPORT



Fig5 Relay connections



Contact Details J Harding 5 Colwyn Drive Knypersley Stoke-on-Trent Staffs ST8-7BJ

roy@diycnc.co.uk www.diycnc.co.uk



Dimensions