

# MK5 5-Axis Controller

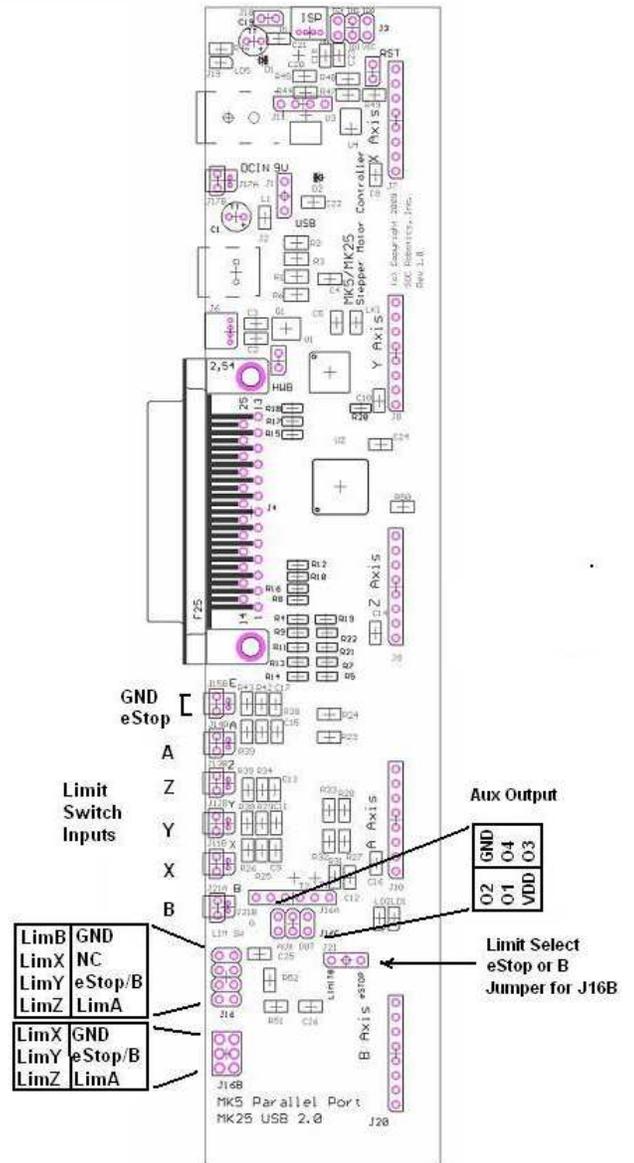
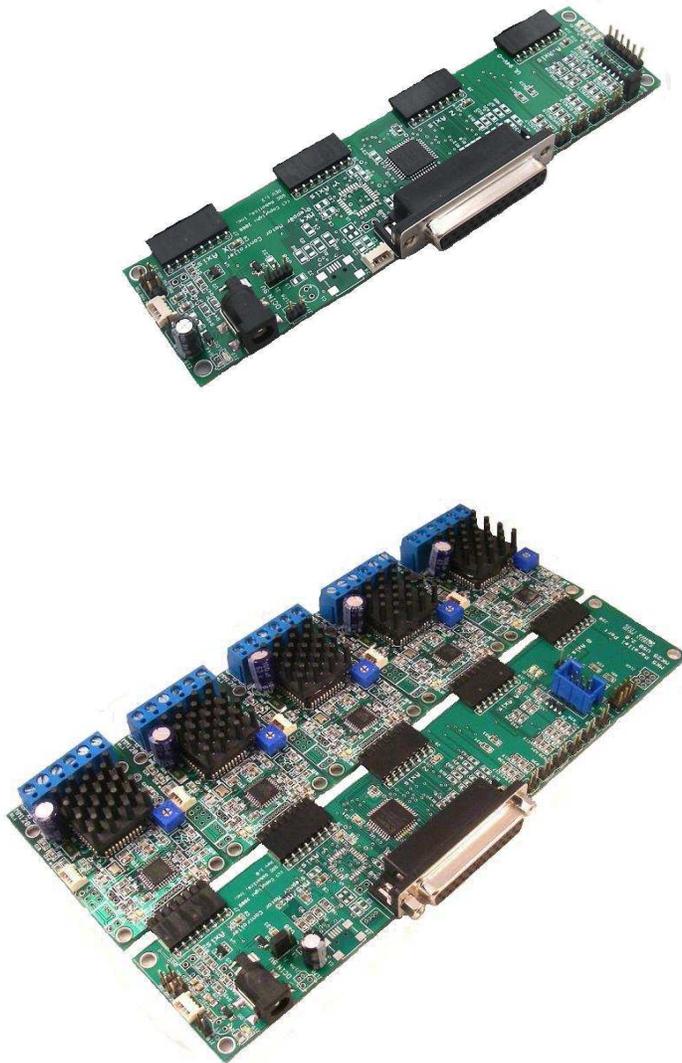
## Technical Reference Manual

PCB Rev 1.0

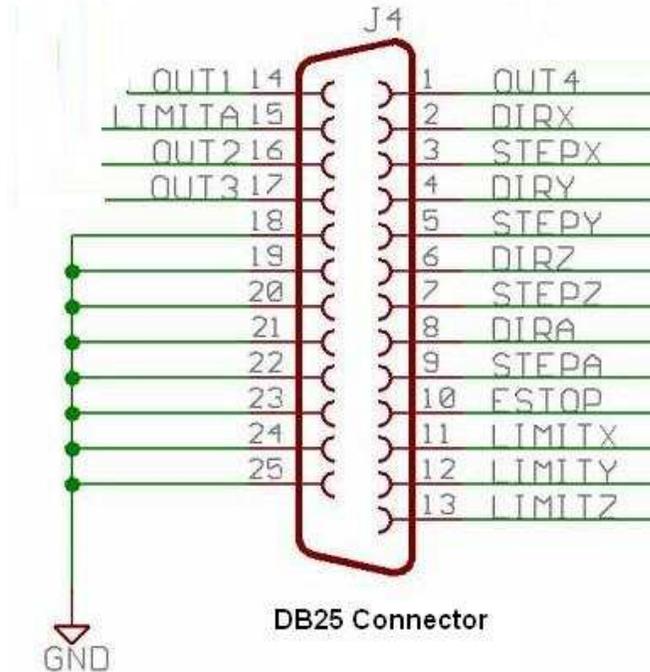


**Introduction**

The MK5 is a 5-Axis breakout board that accepts the MM120, MM130, MM133 or MM220 stepper motor drivers. The MK5 connects step and direction inputs from the PC parallel port to each of the five axis connectors. The correct step and direction signals for each axis must be assigned to the correct parallel port pin. For example DIRX is assigned to pin 2, STEPX is assigned to pin 3, etc. The step signal is an active going high pulse. The circuit schematic shows the mapping between Step/Direction/Limit/Out signals on the DB25 and the four axis ports, limit switch inputs and auxiliary outputs. The MK5 has a CPLD that can be programmed to change the mapping between the DB25 connector and the various other outputs.



MK5 DB25 default pin assignment is shown in the diagram below. Attached drivers such as the MM120, MM130 and MM220 typically expect the step input to be a raising edge. The Direction signal should be set and held before raising the step input.



Auxiliary outputs OUT1, OUT2, OUT3 and OUT4 are connected to DB25 connector pins 14, 16, 17 and 1. Each OUT line drives an NPN transistor in an open collector configuration. A high level on an OUT line causes the transistor to conduct. The collector of the transistor is connected to the auxiliary output header. The transistor can be used to turn on a relay by attaching one side of the relay to the collector and the other side to +5, +12 or +24 volts. Each transistor is capable of driving about 100ma. Beside the header are four LEDs – a high level on an OUT line turns the respective LED on showing the active state of each OUT line.

Limit switch inputs for the X, Y, Z and A axis are connected to the DB25 pins 11, 12, 13 and 15 respectively. The eStop switch input is connected to DB25 connector pin 10. The eStop and limit switch inputs are pulled high by a 10K ohm resistor. When an external limit switch contact closes it pulls the limit switch input low the state of which is reflected on the DB25. eStop operates similarly to the limit switch input – closing the eStop with contacts pulls the eStop input low.

A small white four pin Molex connector located near the DC Power connector is the ISP programming port. This connector is used with suitable programming software and a short four wire cable to re-Flash (re-program) any attached motor controller.

A small white four pin Molex connector beside the DB25 connector is the I2C communications port the signals of which are routed to the four axis connectors. An external I2C communications Master such as the USB10 can talk to the MK5.

## Electrical and Mechanical Description

### 4.1 Electrical Specifications

#### Electrical

Input power: 8-9VDC @ 24ma

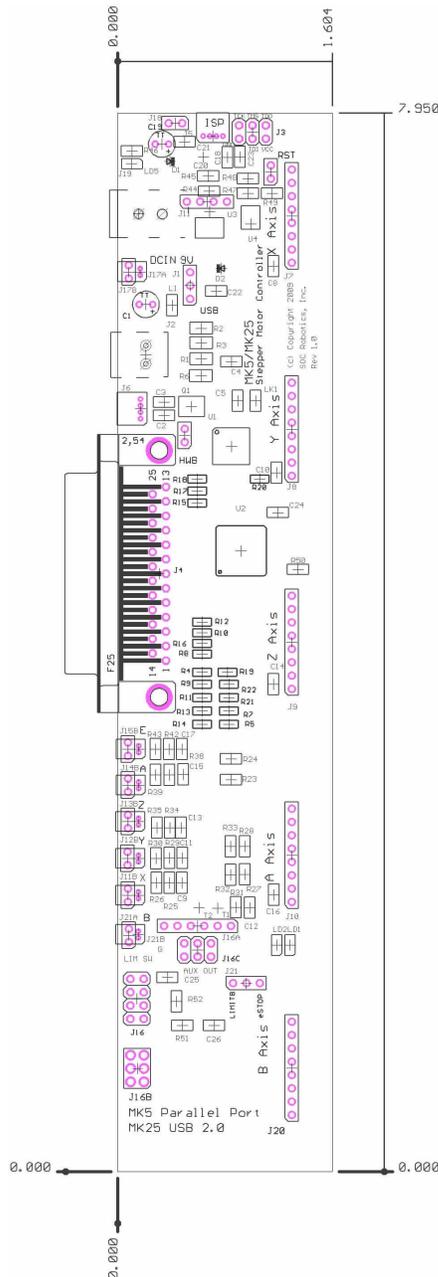
#### Mechanical

Dimensions: 1.65x6.35 in

Weight: 40 grams

### 4.2 Mechanical Dimensions

Board dimensions are stated in inches.



## MK5 Circuit Schematics

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# MK5 5-Axis USB/Parallel Port Control with High Voltage Regulator PCB Rev 1.0

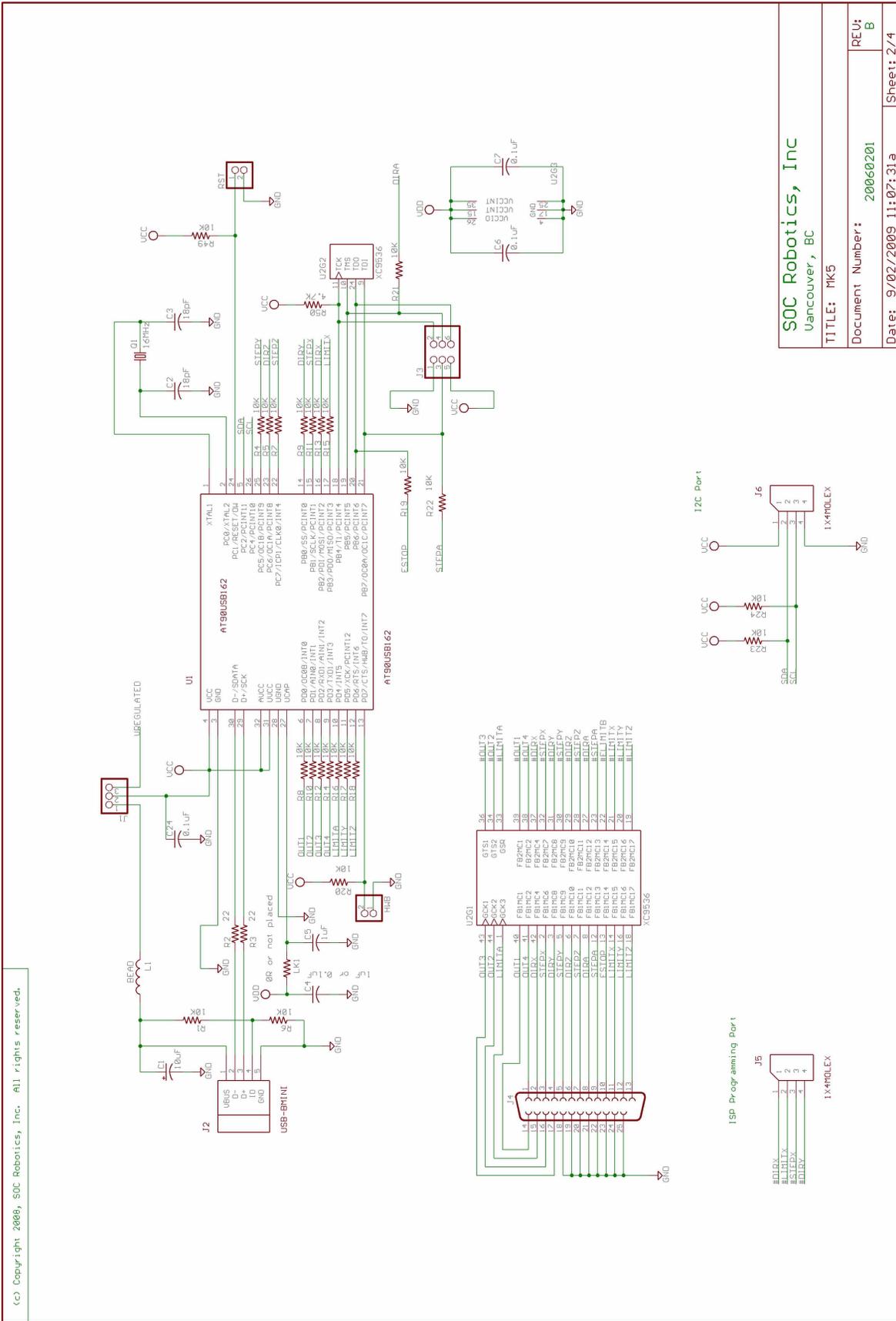
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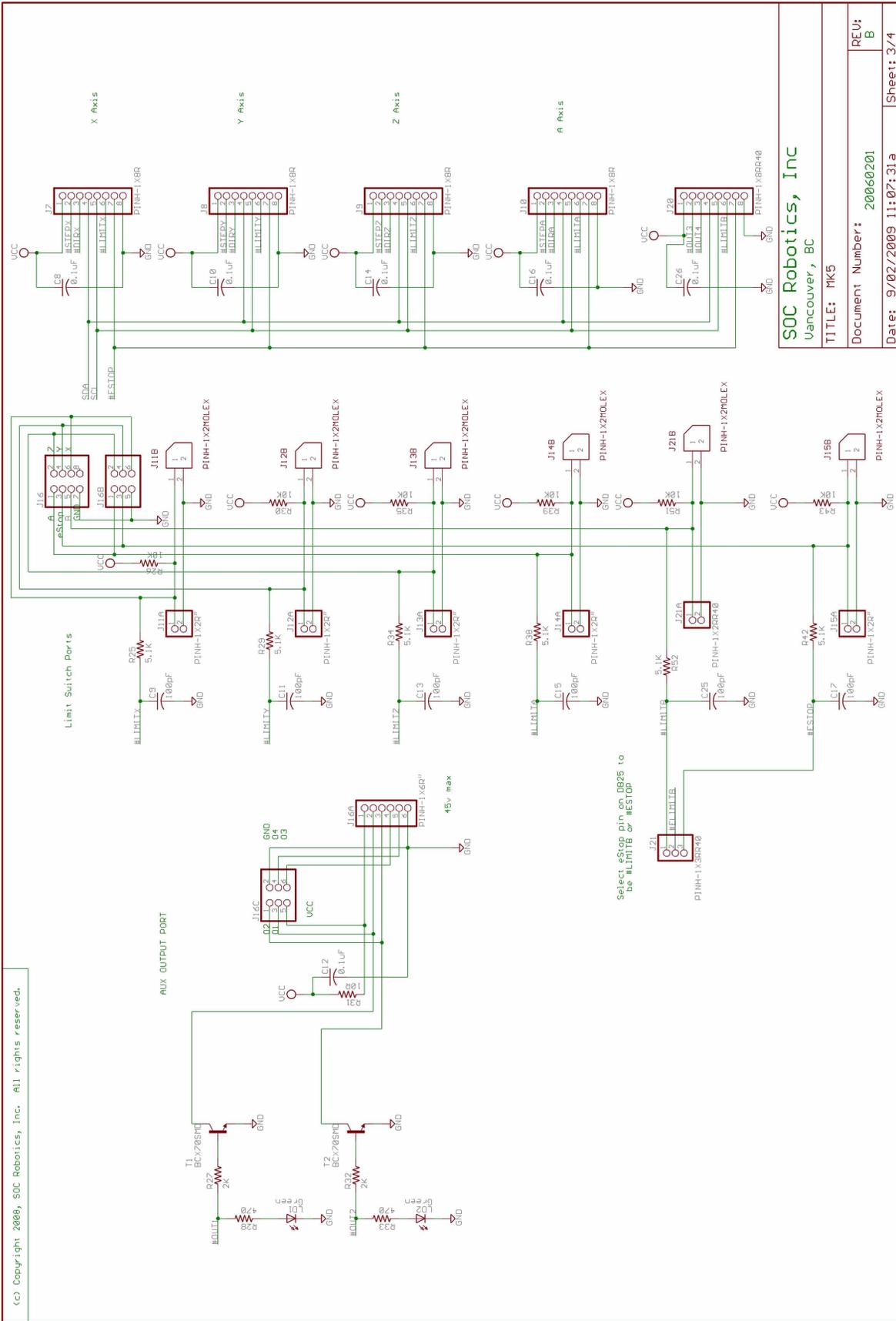
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