MOTOR-1

STEPPER MOTOR DRIVER PERIPHERAL BOARD Technical Manual

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1. Overview

Stepper motor driver peripheral board is a peripheral board for the MINI-MAX/51, MINI-MAX/908, MINI-MAX/PIC, MINI-MAX/11-A and PRO-MAX series of micro-controller boards. It offers complete control and drive for a four-phase unipolar stepper-motor with continuous output current ratings to 1.25 A per phase (1.5 A startup) and 35 V. It requires external power source to drive motor.

2. Specifications

MOTOR-1 board has the following configuration:

- Integrated unipolar stepper motor controller UCN5804 (U1).
- 7-pin terminal block for external power source and motor connections (X1).
- 4-pin connector for external control (J2).
- Jumper switch to select a port pin to control STEP line (JP6…JP9)
- Jumper switch to select a port pin to control DIRECTION line (JP10…JP15)
- Jumper switch to select a port pin to control OE line (JP3…JP5,JP16)
- Mode select (1 PHASE / 2 PHASE and STEP / HALF-STEP) jumpers (JP1, JP2)
- 20-pin connector to a variety of micro-controller boards.
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.125 inches (3.18 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.

3. Expansion bus

The 16 control pins and 5 Volt power supply pins are available on the 20-pin connector (J1) for interfacing to existing micro-controller boards. MOTOR-1 board can be connected to a host board either as a piggyback daughter-board using standoffs or can be placed away from the host board using a 20-wire ribbon cable (Part #: EXPCABLE-6). Table 1 shows the pin assignments for the connector.

Input Connector (J1)

Signal	Pin	Pin	Signal
P3.0	20	19	P3.1
P3.2	18	17	P3.3
P3.4	16	15	P3.5
P3.6	14	13	P3.7
P1.0	12	11	P1.1
P1.2	10	9	P1.3
P1.4	8	7	P1.5
P1.6	6	5	P1.7
VCC (+5V)	4	3	GND
VCC (+5V)	2	1	GND

Table 1

4. Operating modes

Internal power-on reset circuitry resets outputs in the two-phase drive format to the on state with initial application of the logic supply voltage. After reset, the circuit then steps according to the tables.

The outputs will advance one sequence position on the high-to-low transition of the STEP INPUT pulse. The DIRECTION pin determines the rotation sequence of the outputs. Note that the STEP INPUT must be in the low state when changing the state of ONE-PHASE, HALF-STEP, or DIRECTION to prevent erroneous stepping.

HALF-STEP and ONE-PHASE jumpers will determine the drive format (one-phase, two-phase, or half-step).

The wave-drive format consists of energizing one motor phase at a time in an A-B-C-D (or D-C-B-A) sequence. This excitation mode consumes the least power and assures positional accuracy regardless of any winding in balance in the motor.

WAVE-DRIVE SEQUENCE

Jumpers: Half Step – present, Phase – absent				
STEP	**A**	**B**	**C**	**D**
RESET	ON	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON

Table 2

Two-phase drive energizes two adjacent phases in each detent position (AB-BC-CD-DA). This sequence mode offers an improved torque-speed product, greater detent torque, and is less susceptible to motor resonance.

TWO-PHASE DRIVE SEQUENCE

Jumpers: Half Step – present, Phase – present				
STEP	**A**	**B**	**C**	**D**
RESET	ON	OFF	OFF	ON
1	ON	OFF	OFF	ON
2	ON	ON	OFF	OFF
3	OFF	ON	ON	OFF
4	OFF	OFF	ON	ON

Table 3

Half-step excitation alternates between the one-phase and two-phase modes (A-AB-B-BC-C-CD-D-DA), providing an eight-step sequence.

HALF-STEP DRIVE SEQUIENCE

Jumpers: Half Step – present, Phase – present				
STEP	**A**	**B**	**C**	**D**
RESET	ON	OFF	OFF	ON
1	ON	OFF	OFF	OFF
2	ON	ON	OFF	OFF
3	OFF	ON	OFF	OFF
4	OFF	ON	ON	OFF
5	OFF	OFF	ON	OFF
6	OFF	OFF	ON	ON
7	OFF	OFF	OFF	ON
8	ON	OFF	OFF	ON

Table 4

5. Motor and external power supply connection

Figure 1 shows how to connect a stepper motor to the board.

External power supply to drive the motor should be connected to VCC and GND terminals of X2. It should have enough load capability to drive used motor.

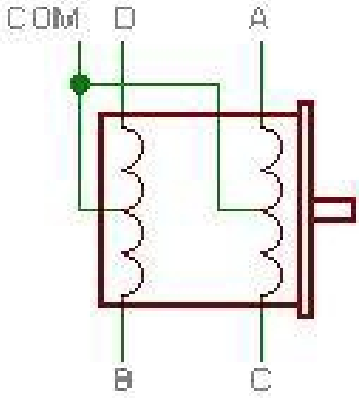

Figure 1

6. Board Layout

Figure 2 shows positions of major components, connectors and terminals on the MOTOR-1 board.

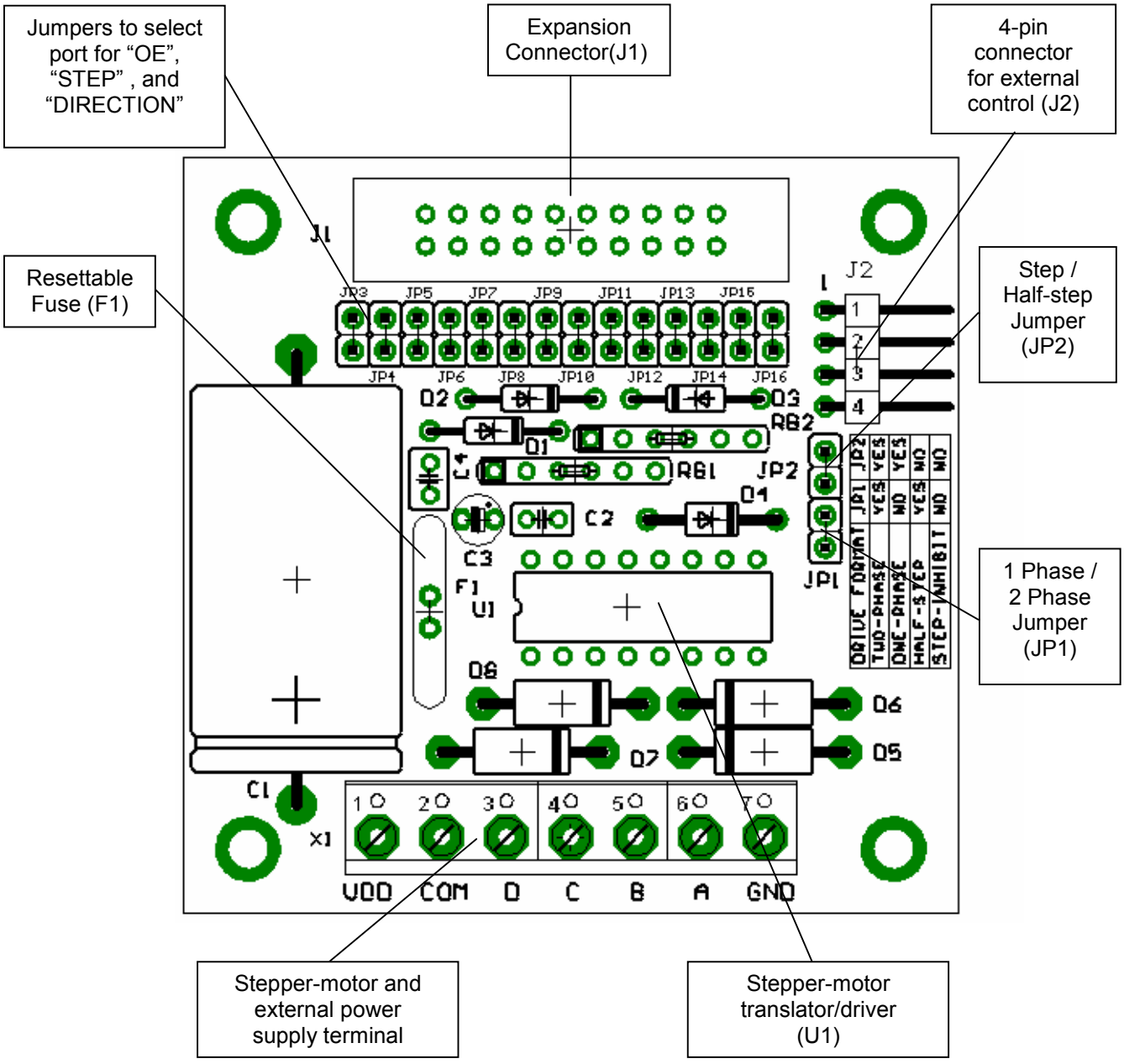

Figure 2

7. Schematics

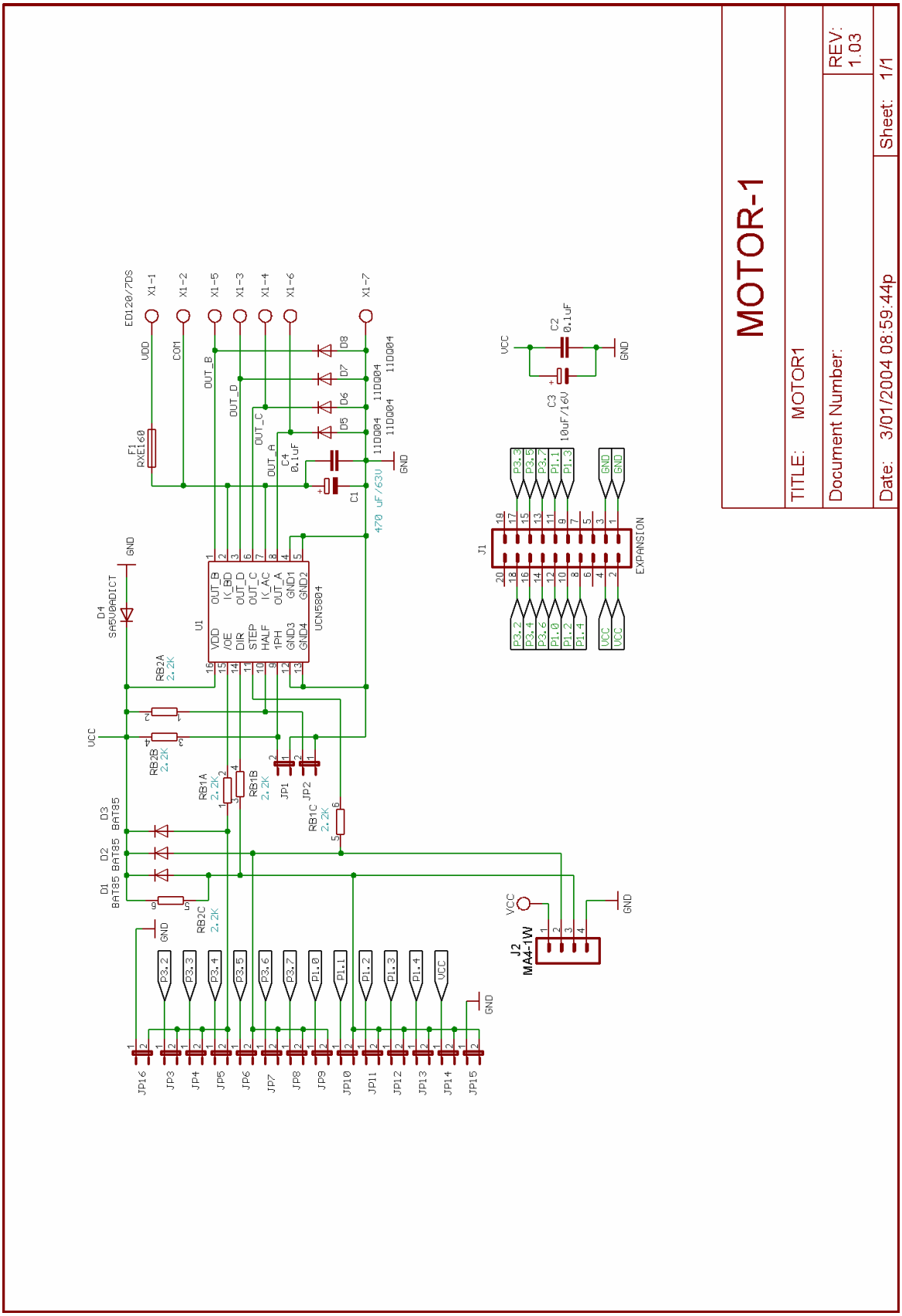

Figure 3