

MCPB-2

Peripheral Board

Technical Manual

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MCPB-2 Peripheral Board Technical Manual. No part of this work may be reproduced in any manner without written permission of BiPOM Electronics.

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WARRANTY:

BiPOM Electronics warrants MCPB-2 for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to MCPB-2. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

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1. Overview

MCPB-2 is a peripheral board for the MINI-MAX and PRO-MAX series of micro-controller systems. It is based on the ATMEL ATMEGA168V-10 single-chip Flash micro-controller and Allegro Microsystems Inc. Stepper Motor Driver IC A3979.

This micro-controller features

- Up to 10 MIPS Throughput at 10 MHz
- 16 Kilobytes of In-System Re-programmable Downloadable Flash Memory
- 1 Kilobytes bytes of RAM
- 512 bytes of EEPROM
- Two 8 bit Timer/Counters and one 16 bit Timer/Counters
- Programmable Watchdog Timer
- Programmable Enhanced UART Serial Interface
- SPI Serial Interface
- 2-wire Serial Interface (I²C)
- 6 Pulse Width channels
- 8 channel 10-bit ADC
- 23 general purpose I/O pins
- In-System programming by on-chip boot program

MCPB-2 board complements these features by providing

- Control over a bipolar stepper motor in full-, half-, quarter-, and sixteenth-step modes with an output drive capacity of up to 35V and $\pm 2.5A$.
- Silicon Labs digital isolator IC's with 2500 VRMS isolation are used as couplers.
- Can be operated in real time with an external host micro-controller or can be Programmable for stand-alone operations.

The Flash micro-controller can be serially programmed while in the target application circuit. Customers can program the micro-controller with the most recent firmware or custom firmware. This function of the FLASH micro-controller simplifies new program development and debugging. Downloading of a program to the micro-controller typically takes few seconds.

Software development systems based on [AVR Studio](http://www.atmel.com/) Integrated Development Environment from ATMEL (<http://www.atmel.com/>). The development system fully supports in-system programming on the MCPB-2 board using the SPI Interface.

MCPB-2 motor drivers should be powered from a 12 to 35 Volt (DC) external power source. Digital isolated control circuitry and ATMEGA168V-10 should be powered a 5 Volt (DC) external power source. A current consumption is not more than 130mA. In stand-alone mode the control circuitry may be powered from the 12 to 35 Volt (DC) motor power source.

Software examples for MCPB-2 are available from <http://www.bipom.com/>

2. Specifications

MCPB-2 board has the following configuration:

- ATMEL ATMEGA168V-10 micro-controller with
 - 16 Kbytes on-chip Flash program/data Memory,
 - 1 Kbytes RAM
 - 512 bytes EEPROM
- SPI Port connector for In-circuit Programming and for data communications.
- RS232 Serial Port for data communications.
- 10-pin terminal block to connect four stepper motor wings and a motor power source.
- 20-pin Expansion connector for a peripheral boards or a host micro-controller boards.
(<http://www.bipom.com/boards51.shtml>)
- Jumper blocks to select a work mode.
- Two push button switches to drive the motor by hands.
- Single operating voltage: 12 to 35 VDC (up to 2.5A) for stand-alone operations.
- Secondary operating voltage: 4.5 to 5.5V 130 mA maximum supply consumption for coupled operations.
- On-board 5 Volt regulator.
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.138 inches (3.5 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.

3. Functional Blocks

Figure 1 shows the block diagram of the MCPB-2 board

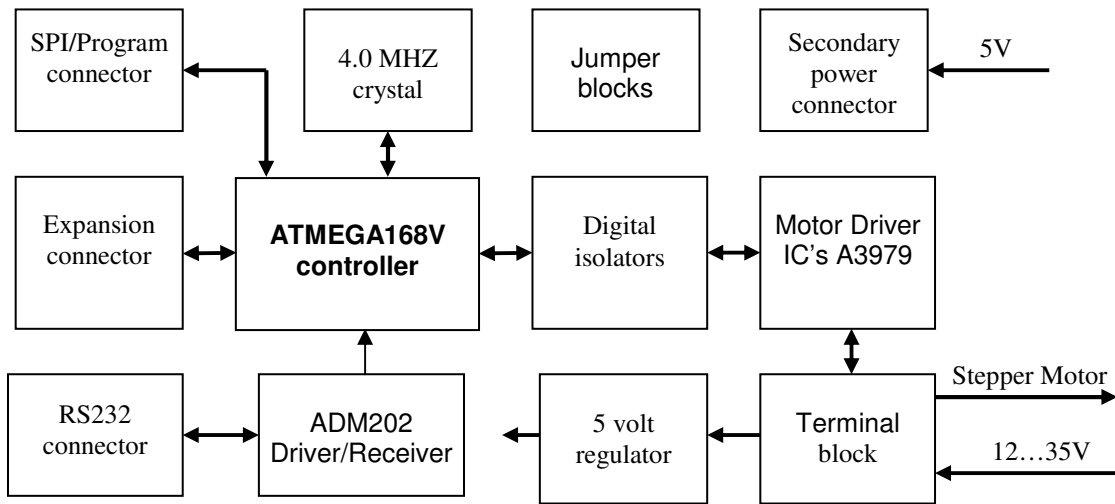


Figure 1

SPI Port connector

SPI port is available on a 6-pin male connector X1.

Table 1 shows the pin assignments for the SPI port connector

SPI Port Connector (X1)

Name	Signal	Pin
MISO	SPI Data Input/Output	1
VCC	+5V output	2
SCK	SPI clock	3
MOSI	SPI Data Input/Output	4
/RST	ATMEGA Reset Input	5
GND	GND	6

Table 1

Expansion connector

6 control pins and 5 Volt power supply pins are available on 20-pin connector X2 for interfacing to peripheral boards or host board. A peripheral board can be connected to MCPB-2 board either as a piggyback daughter-board using standoffs or can be placed away from the micro-controller board using a 20-wire ribbon cable (Part #: EXPCABLE-6).

Table 2 shows the pin assignments for the X2 connector.

Connector X6

Signal	Pin	Pin	Signal
NC	20	19	NC
NC	18	17	MISO
SCK	16	15	SS
NC	14	13	MOSI
NC	12	11	NC
NC	10	9	NC
NC	8	7	NC
I2C SCL	6	5	I2C SDA
NC	4	3	GND
VCC (+5V) input	2	1	NC

Table 2

Asynchronous Serial Port

Asynchronous RS232 serial port is available on a 10-pin male connector X3.

Table 3 shows the pin assignments for the RS232 serial port connector

Serial Port Connector (X3)

Name	Signal	Pin
-	Not Connected (NC)	1
-	Not Connected (NC)	2
RXD	MCPB-2 Input	3
RTS	MCPB-2 Output	4
TXD	MCPB-2 Output	5
CTS	MCPB-2 Input	6
-	Not Connected (NC)	7
-	Not Connected (NC)	8
GND	GND	9
-	Not Connected (NC)	10

Table 3

Output terminal

Table 4 shows the pin assignments for the output terminal X7

Output terminal X7

Name	Signal	Pin
Vp	12 to 35 VDC (up to 2.5A) input	1
OUT2B	Output for Motor wing 2-B	2
OUT2A	Output for Motor wing 2-A	3
OUT1B	Output for Motor wing 1-B	4
OUT1A	Output for Motor wing 1-A	5
OUT4B	Output for Motor wing 4-B	6
OUT4A	Output for Motor wing 4-A	7
OUT3B	Output for Motor wing 3-B	8
OUT3A	Output for Motor wing 3-A	9
GND	GND	10

Table 4

Power Supply

External power supply should be able to supply 12...35 Volts DC at 2.5 A current

WARNING:

Correct polarity should be observed when applying external DC supply to terminal X7.

4. Application Notes

A peripheral board can either be stacked on top of MCPB-2 using stand-offs or connected in a chain configuration using flat ribbon cable. Figure 2 shows how MCPB-2 peripheral board can be connected to a Micro-Computer board in a stacked fashion. Figure 3 shows the chain connection.

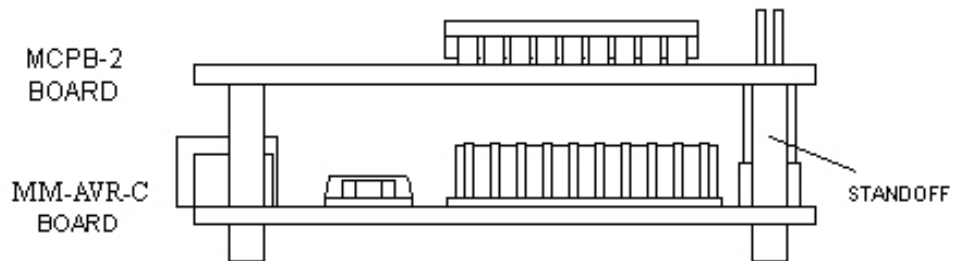


Figure 2

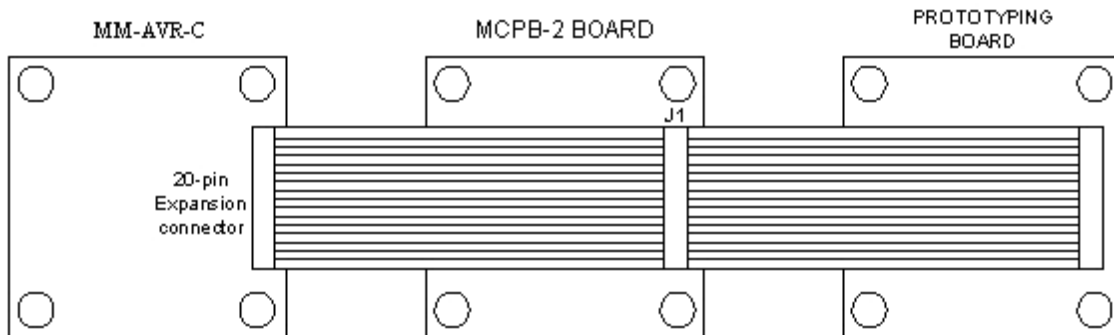


Figure 3

More details concerning BiPOM Peripheral boards are available from the link below:

http://www.bipom.com/periph_boards.shtm

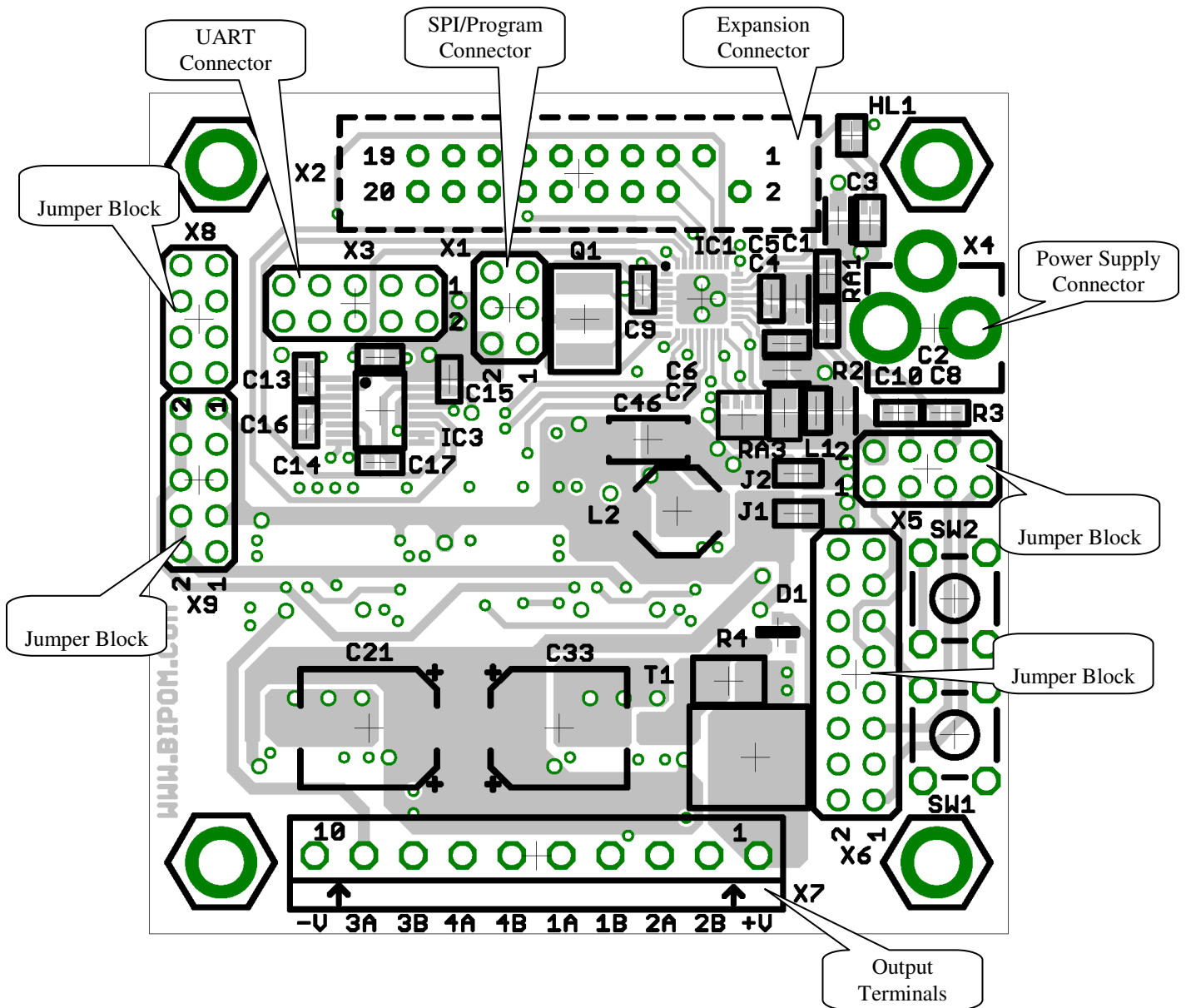
8051/52, BASCOM51 and SDCC (Small Device C Compiler) development systems provide examples for MCPB-2.

Please download any of these development systems from:

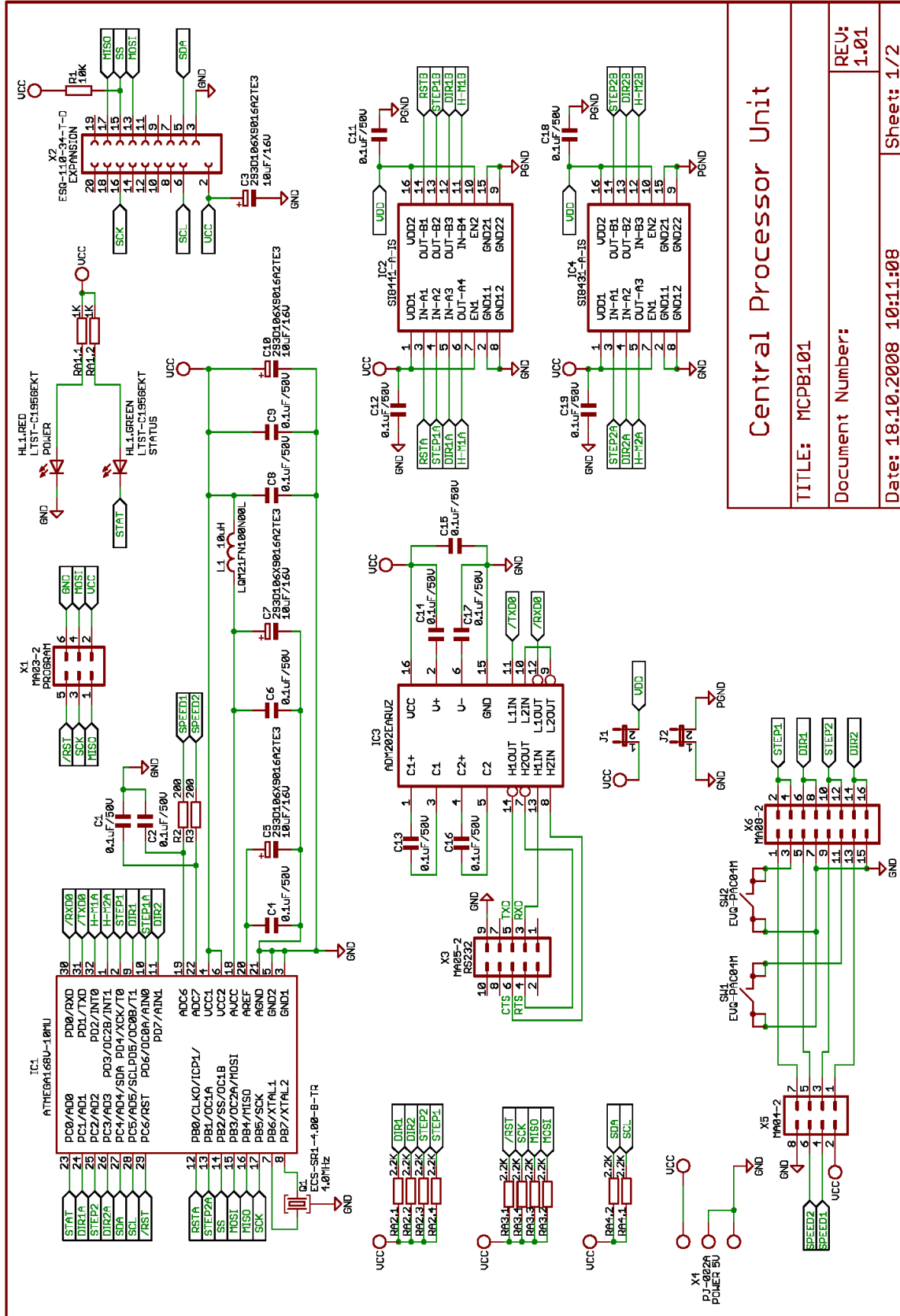
<http://www.bipom.com/software.shtm>

5. Board Layout

Layout of the MCPB-2 board is shown below:

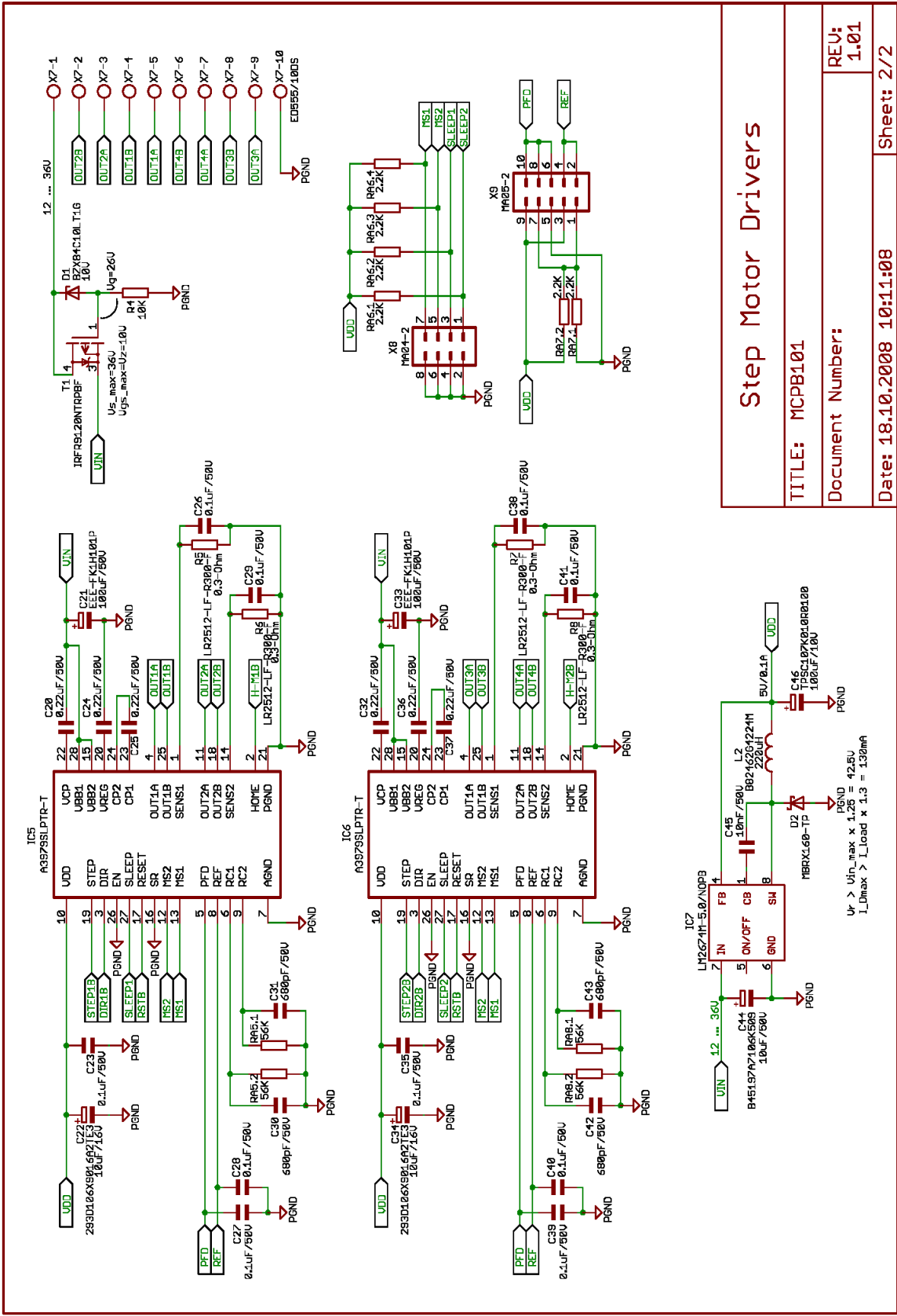


6. Schematics



Central Processor Unit

TITLE: MCPB101
 Document Number:
 Date: 18.10.2008 10:11:08
 REV: 1.01
 Sheet: 1/2



Step Motor Drivers

TITLE: MCPB101
 Document Number:
 Date: 18.10.2008 10:11:08
 REV: 1.01
 Sheet: 2/2