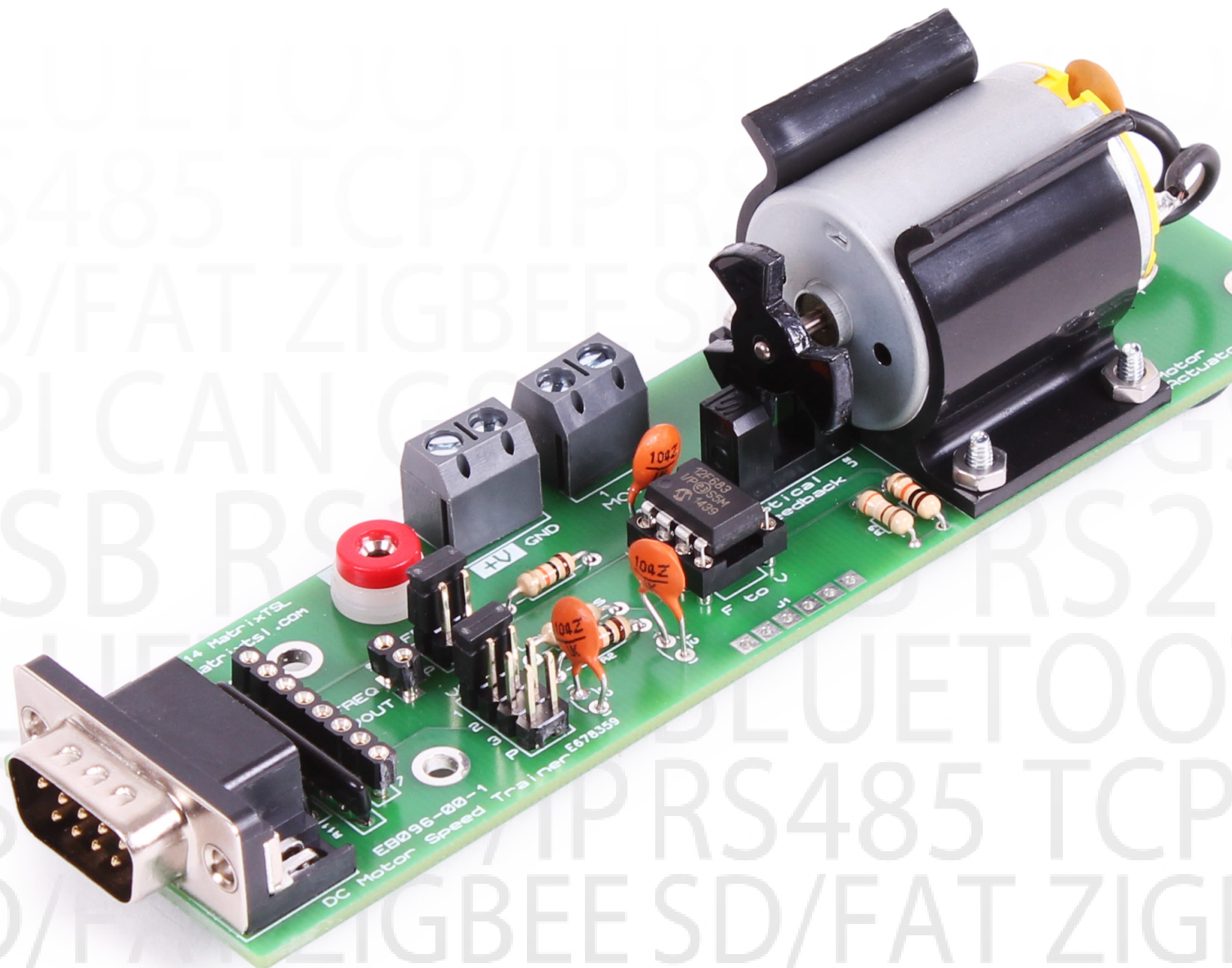


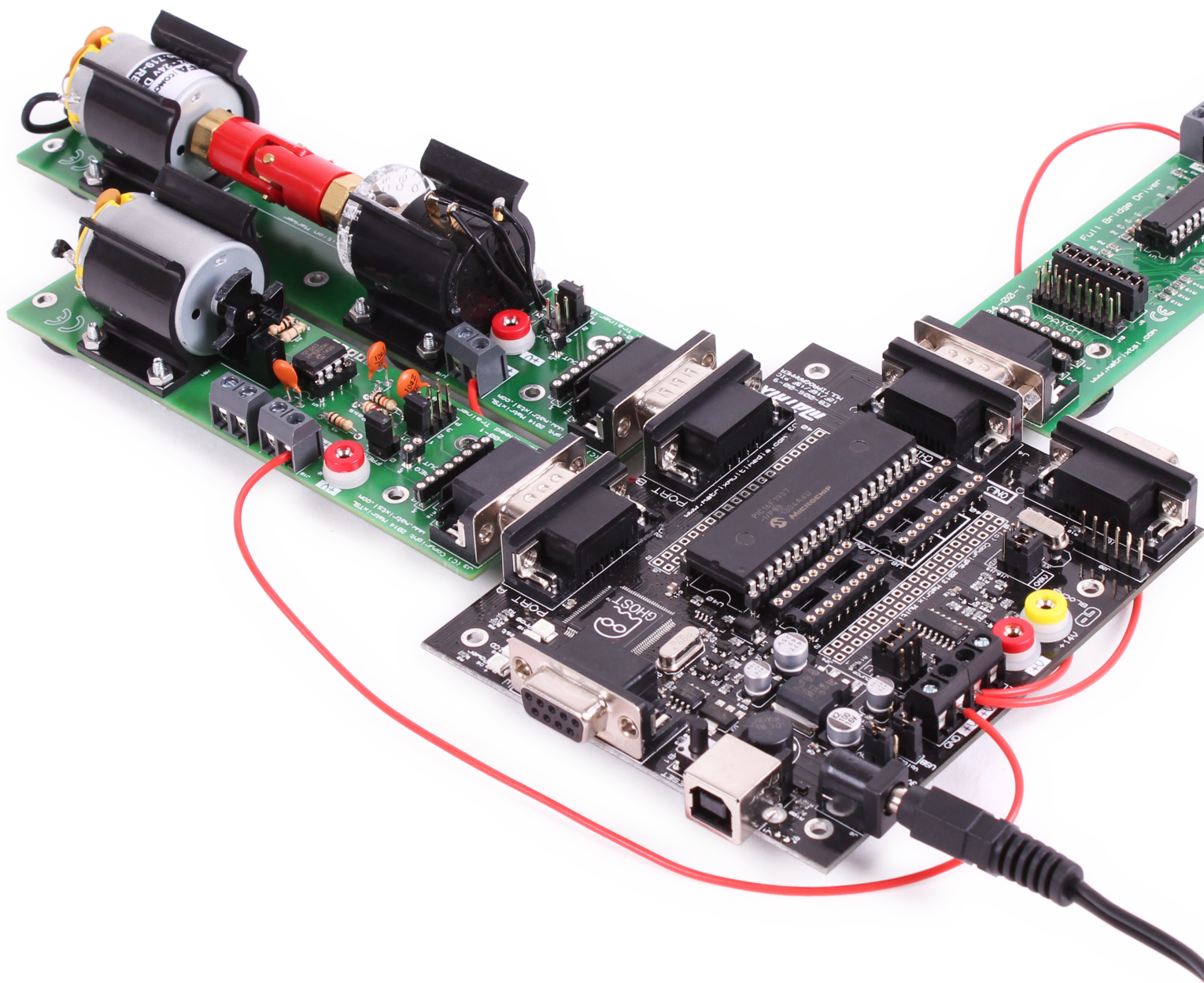
E BLOCKS[®]

Motor speed trainer board



Contents

About this document	3
Board layout	3
General information	4
Protective cover	4
Circuit description	4
Circuit diagram	5



About this document

This document concerns the EB096 E-blocks motor speed trainer board.

1. Trademarks and copyright

PIC and PICmicro are registered trademarks of Arizona Microchip Inc. E-blocks is a trademark of Matrix TSL Ltd.

2. Other sources of information

There are various other documents and sources that you may find useful:

- *Getting started with E-blocks.pdf* - This describes the E-block system and how it can be used to develop complete systems for learning electronics and for PICmicro programming
- *PPP help file* - This describes the PPP software and its functionality. PPP software is used for transferring

hex code to a PICmicro microcontroller

- *C and Assembly strategies* - Not provided for this product

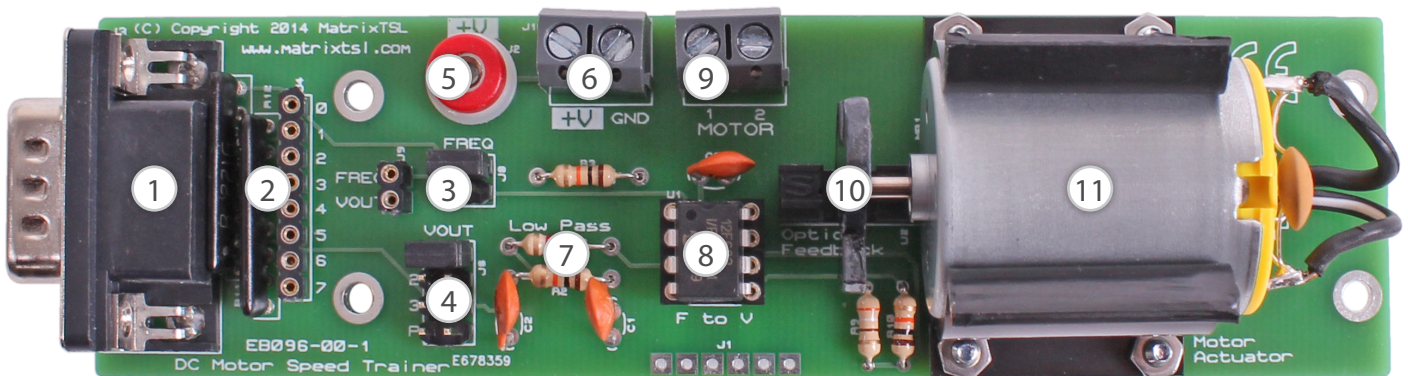
3. Disclaimer

The information provided within this document was correct at the time of going to press. Matrix TSL reserves the right to change specification from time to time. This product is for development purposes only and should not be used for any life-critical application.

4. Technical support

If you have any problems operating this product then please refer to the troubleshooting section of this document first. You will find the latest software updates, FAQs and other information on our website: www.matrixtsl.com

Board layout



1. D-type E-blocks connector - to Programmer board
2. Patch system
3. Connection jumpers - digital frequency
4. Connection jumpers - analogue voltage
5. +V 2mm patch socket
6. +V screw terminals

7. 2nd order low pass filter
8. PIC12F frequency to voltage converter
9. Motor control terminals
10. IR beam break feedback
11. DC motor

General information

This E-blocks board features a DC motor with a laser cut plastic gear attached to its shaft. The gear sits inside an optical infra-red beam break to provide digital feedback relating to the speed of the motor. This digital feedback is then fed into an on board PIC12F device which converts the digital frequency into an analogue voltage. This makes the job of determining the motor speed much simpler for the user application. Both the digital and analogue feedback are fed to the upstream microcontroller using the on board patch system

allowing any microcontroller pins to be used to suit the purpose.

Features:

- E-blocks compatible
- DC motor
- Optical feedback
- Frequency to voltage conversion
- Highly ruggedised for a lab environment

Protective cover

Most of the boards in the E-blocks range can be fitted with a plastic cover as an optional extra. These covers are there to protect your E-blocks board therefore extending the life of the board. The covers also prevent the removal of external components while still allowing for the adjustment of applicable parts on the board.

12mm M3 spacers, anti-slip M3 nuts and 25mm M3 bolts can be used to attach the cover to the board. These are not included but can be bought separately from our website.

The order code for the EB096 DMOS motor driver board is EB796.

Circuit description

Digital feedback

The digital feedback is generated by the plastic gear connected to the motor which sits inside the IR beam breaker component. The digital frequency output from the beam breaker is proportional to the speed of the motor. From tests the minimum motor speed produces a frequency around 10Hz and the maximum motor speed produces a frequency around 400Hz.

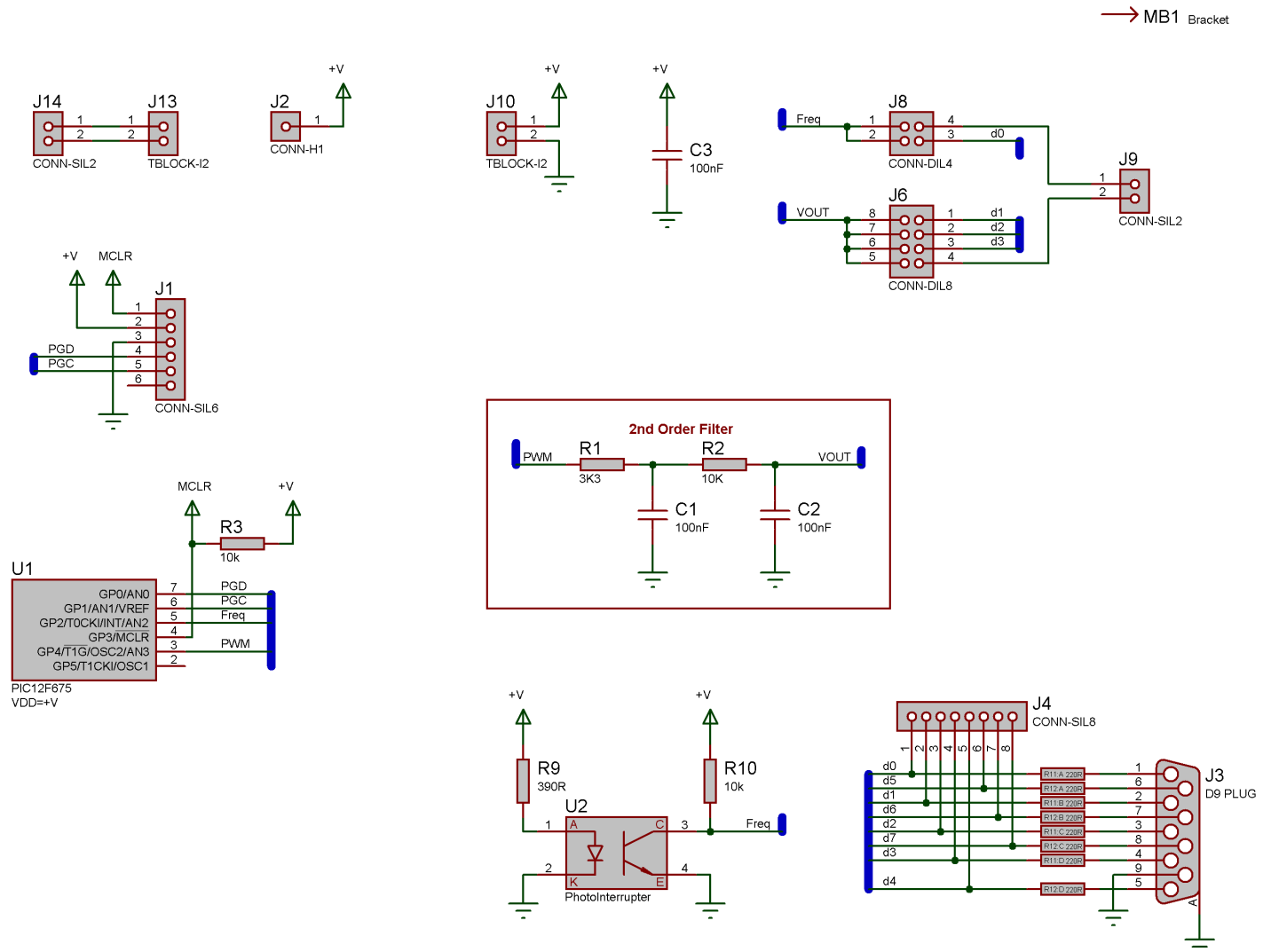
Frequency to voltage

The PIC12F device is used to convert the digital frequency from the beam breaker component into a high speed pulse width modulated (PWM) output. The duty cycle of the PWM is controlled by the frequency of the beam breaker circuit. The PIC12F device will run well with both 5V and 3V3 systems.

Low pass filter

The low pass filter is used to allow the PWM signal being output from the PIC12F device to be converted into a voltage between 0V and +V. 0V represents full speed operation. Values in between 0V and +V can be read using an ADC peripheral which will provide you with an instantaneous representation of the current speed of the motor.

Circuit diagram





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