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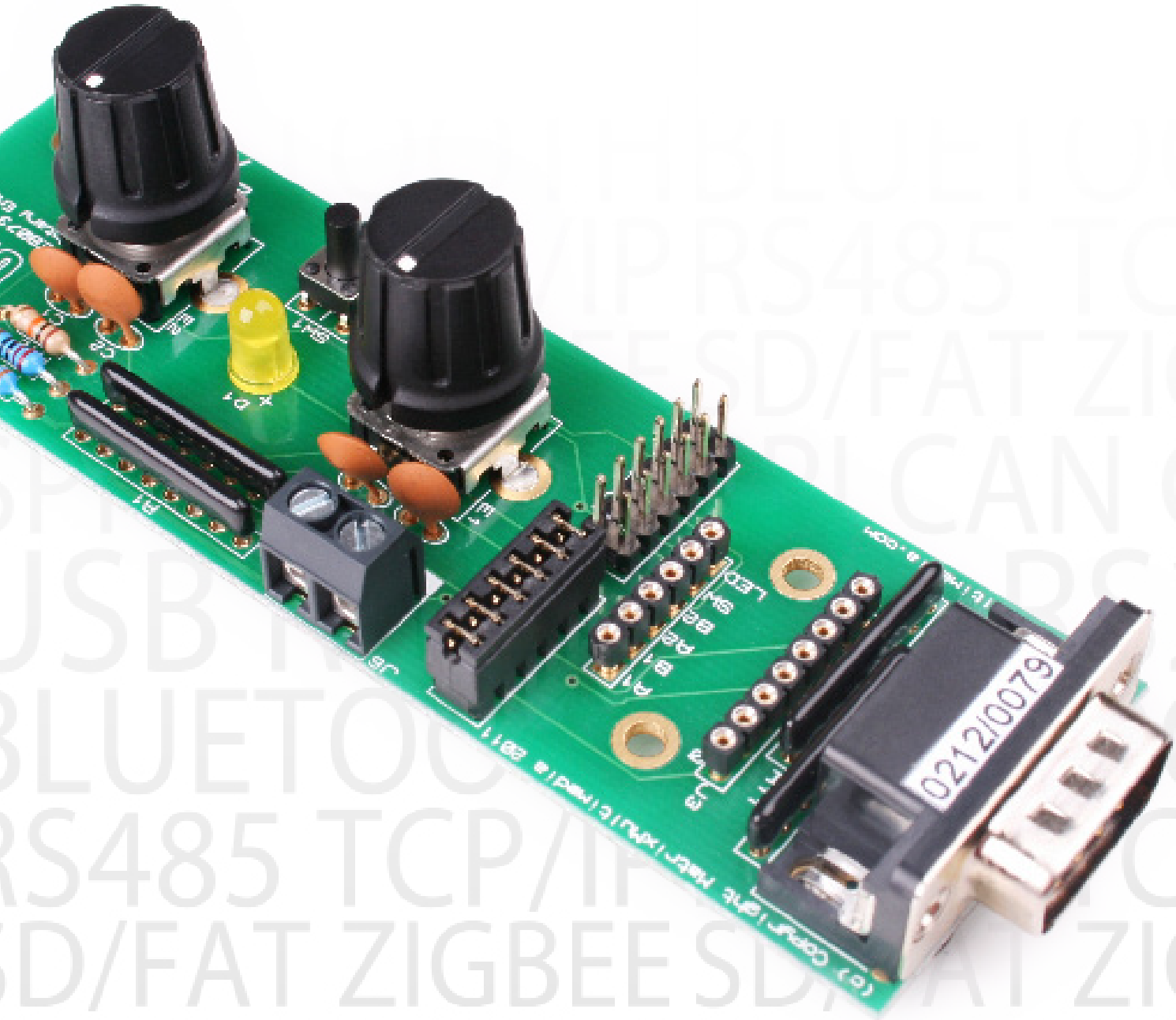
eBLOCKS®

Rotary encoder board



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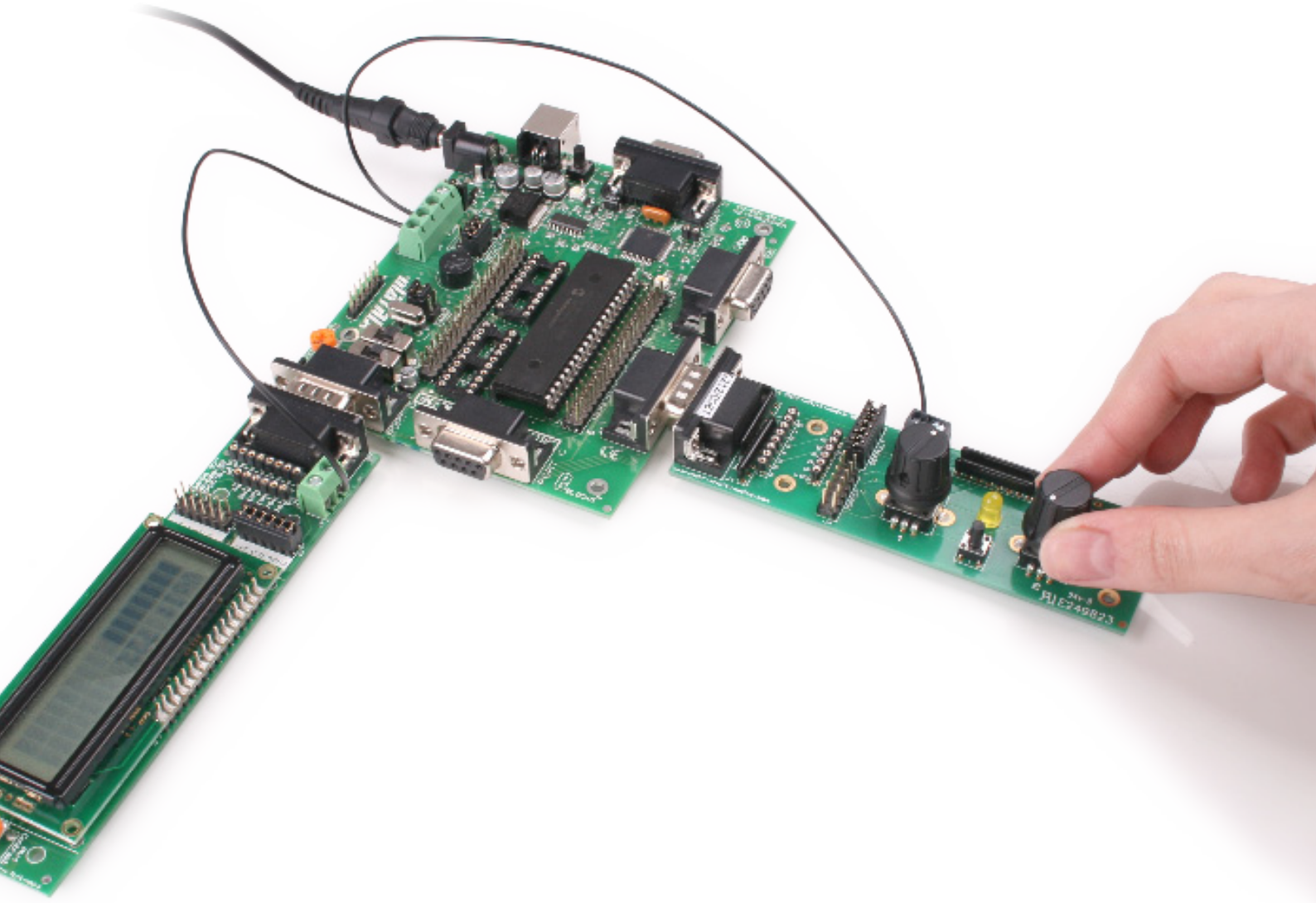

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About this document

This document concerns the EB073 E-blocks rotary encoder board.

1. Trademarks and copyright

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2. Disclaimer

The information provided within this document is correct at the time of going to press. Matrix TSL reserves the right to change specifications from time to time.

3. Testing this product

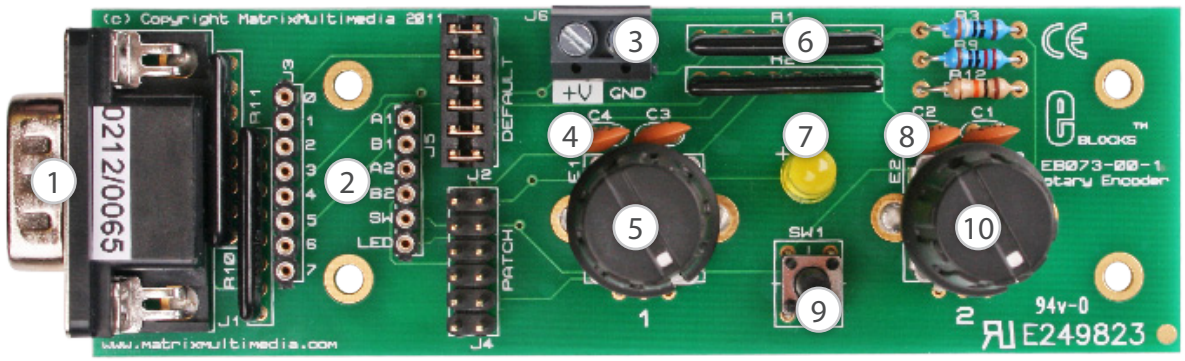
It is advisable to test the product upon receiving it to ensure it works correctly. Matrix provides test procedures for all E-blocks, which can be found in the Support section of the website.

4. Product support

If you require support for this product then please visit the Matrix website, which contains many learning resources for the E-blocks series. On our website you will find:

- How to get started with E-blocks - if you are new to E-blocks and wish to learn how to use them from the beginning there are resources available to help.
- Relevant software and hardware that allow you to use your E-blocks product better.
- Example files and programs.
- Ways to get technical support for your product, either via the forums or by contacting us directly.

Board layout



1. Downstream 9-way D-type connector
2. Patch system
3. Screw terminals
4. Low pass folter 1
5. Rotary encoder 1
6. Signal bias resistors
7. LED
8. Low pass filter 2
9. Switch
10. Rotary encoder 2

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General information

The board features two rotary encoders, a standard digital switch and an output LED. The rotary encoders each have two digital outputs in a quadrature format that can be read by the upstream microcontroller. The quadrature format means that the microcontroller can detect which way the encoder is turning, how fast and how many rotations have been made simply by monitoring the two signals from the encoder.

The connections for the patch jumper system are as shown below.

1. Features

- 2 x rotary encoders with full quadrature outputs
- Digital switch and LED onboard
- 3.3V and 5V compatible
- E-blocks compatible

2. Connections

The patch system on the board is used to allow the onboard signals to be connected though to any of the 8 digital channels or through to another boards or port.

Signal	Default port pin	Patch pin J5
Encoder 1A	Pin4	A1
Encoder 1B	Pin5	B1
Encoder 2A	Pin6	A2
Encoder 2B	Pin7	B2
Switch	Pin0	SW
LED	Pin1	LED

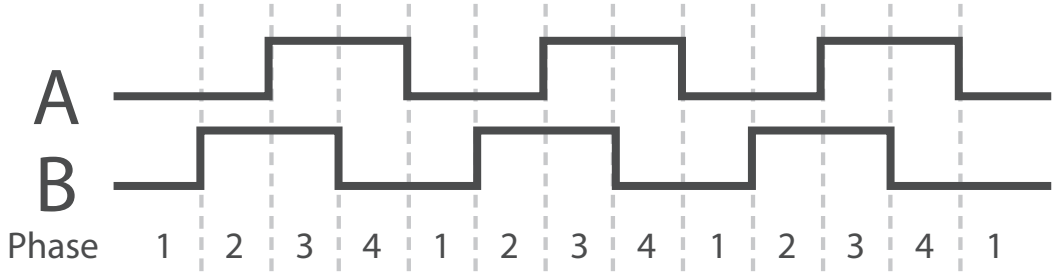
Circuit description

The EB073 rotary encoder circuit can be observed on page 5.

1. Quadrature encoders

Quadrature encoders have two digital outputs (A and B), which indicate the current phase of the rotational shaft. As the encoder shaft is turned the phase increments or decrements depending on the direction of rotation. By monitoring the encoder output phase it is possible to detect how many rotations have occurred in a single direction. Absolute position is not available when using a quadrature encoder unless you have some means of defining an absolute position such as an input from an end stop switch.

The diagram on the right shows the four unique phases of a quadrature encoder output.



2. Interrupt on change (PORT)

Using a port change interrupt it is possible to reliably count encoder phase changes on a microcontroller without having to sit in a tight loop repeatedly sampling the encoder output pins.

3. 3.3V operation

The board is fully compatible for use with 5V and 3.3V systems.

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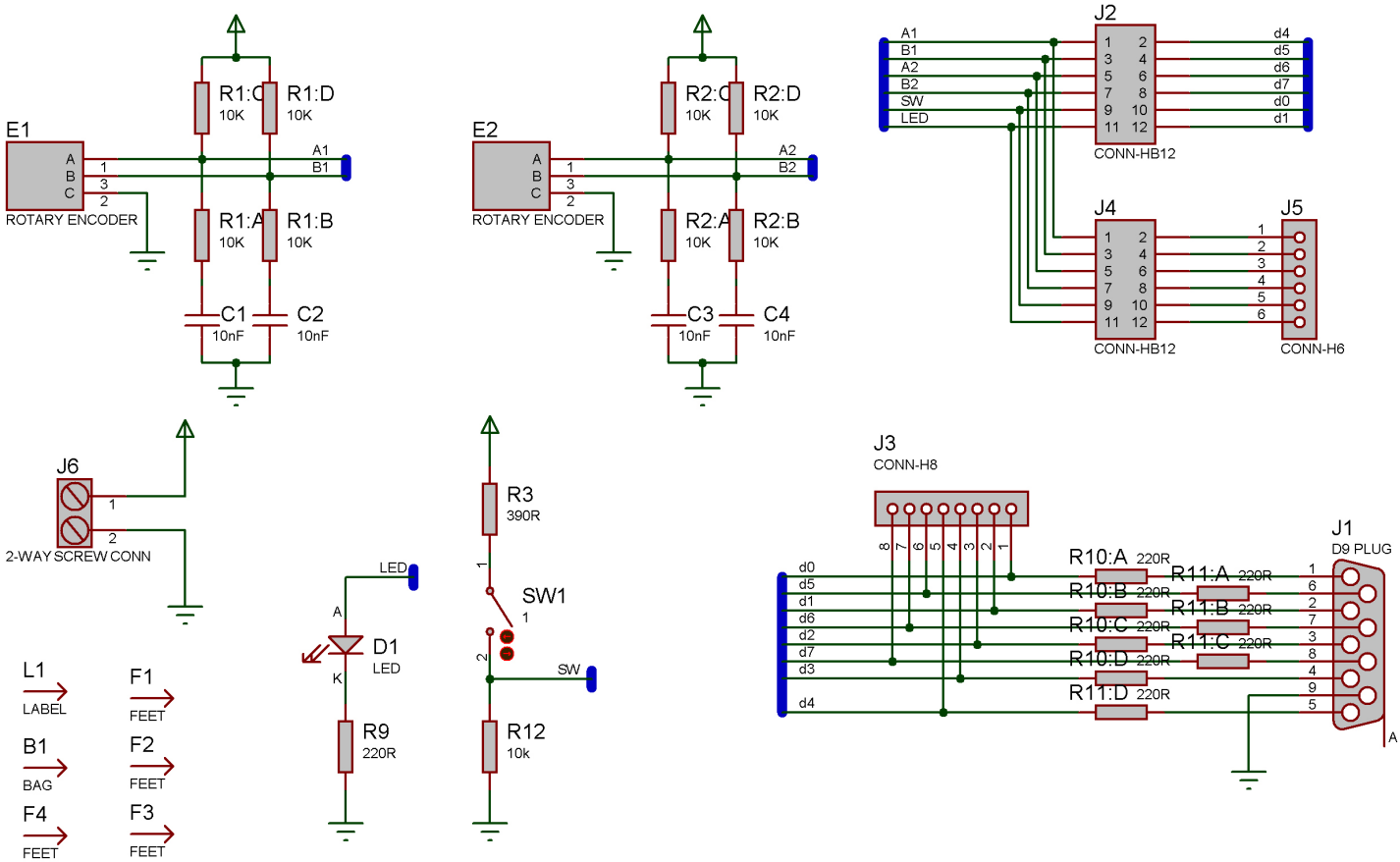
Circuit diagram



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