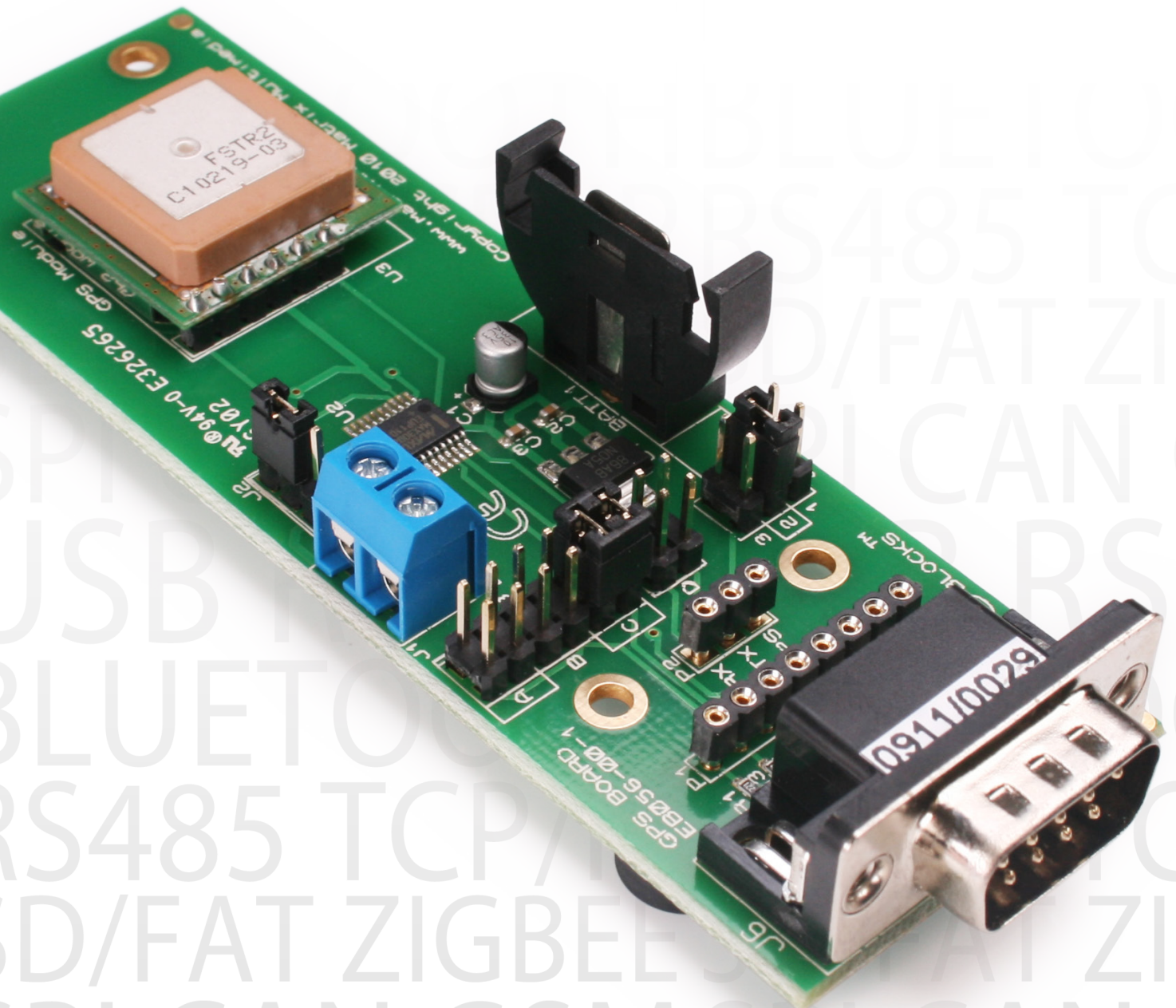


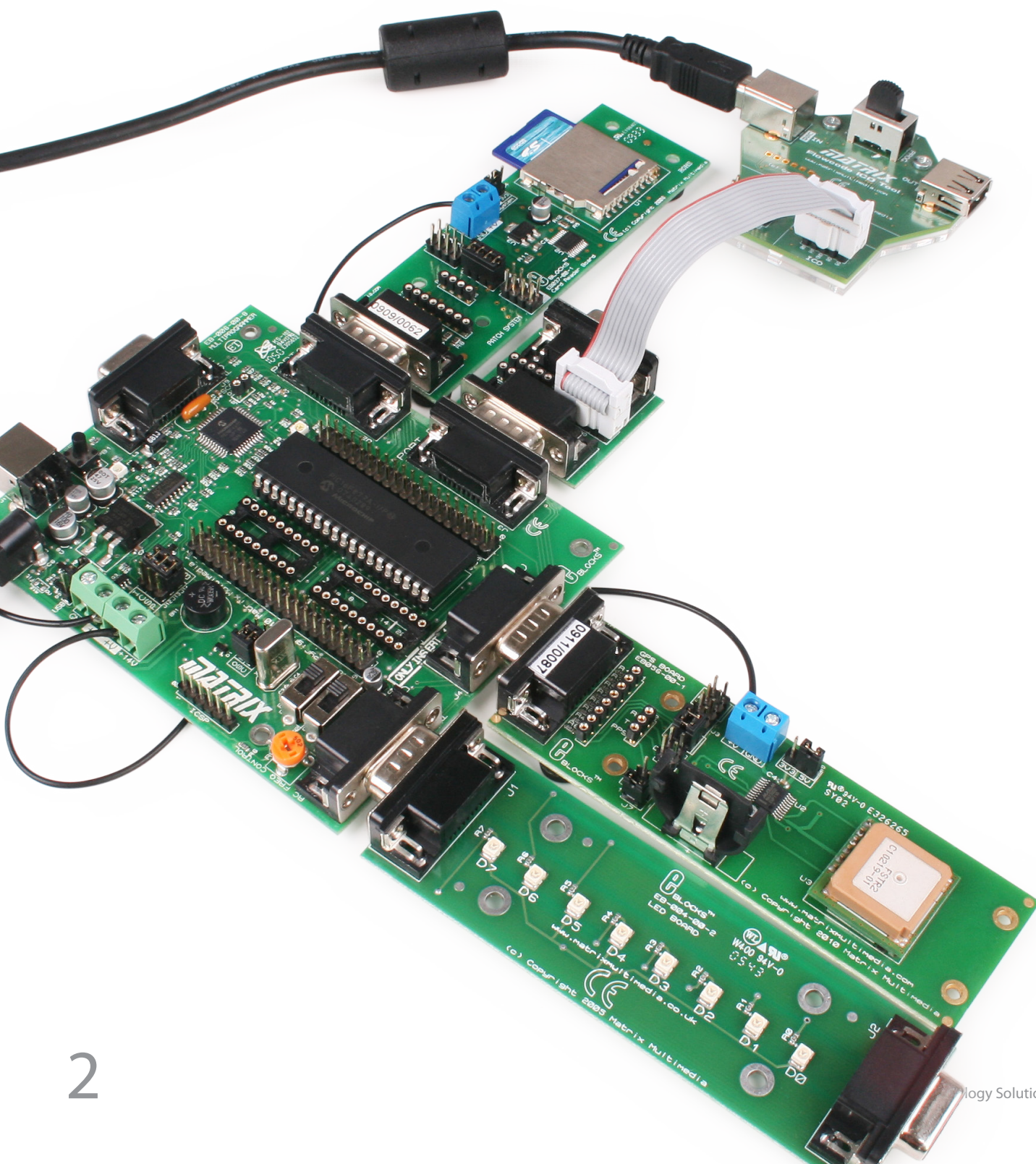
# **EBLOCKS<sup>®</sup>**

GPS board



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# About this document

This document concerns the EB056 GPS board.

1. Trademarks and copyright

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

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

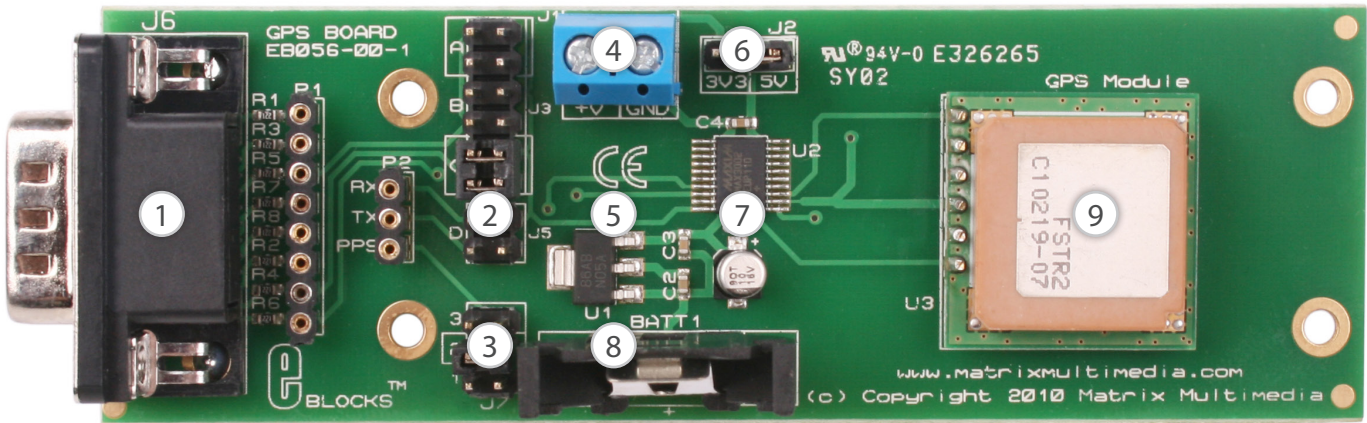
section of the website.

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. 9-way downstream D-type connector
2. TX / RX patch system
3. PPS patch system
4. Input voltage screw terminal
5. 3.3V regulator

6. Input voltage selection system
7. Voltage level shifter
8. 3V battery holder
9. UP500 GPS module and antenna

General guide for RX and TX pin settings:

Jumper at A	Jumper at B	Jumper at C	Jumper at D
PIC16F88	PIC16F627(A)	PIC16F7x	PIC16F87xA
PIC16F87	PIC16F628(A)	PIC16F7x7	PIC16F88x
	PIC16F648A	PIC16F87x	PIC16F19xx

General guide for PPS pin setting:

Jumper settings	Description
1	PPS = Bit 0
2	PPS = Bit 4
3	Patch system

If using a PIC16F88, insert board to Port B and jumper settings = A & 1  
If using a PIC16F877A, insert board to Port C and jumper settings = C & 1

# General information

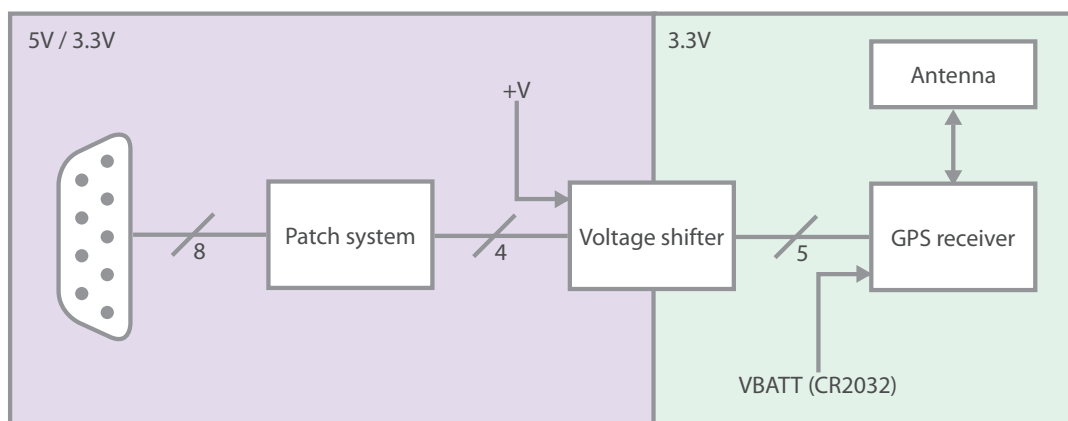
This E-block allows investigation of the global positioning system used in modern satellite navigation equipment. The board allows GPS to be added to microcontrollers and other processors that do not have GPS peripherals embedded into them. The board uses a state of the art UP500 GPS module from Fastrax. The GPS module uses multiple orbiting satellites to calculate its position. Once an initial position has been acquired the GPS receiver continues to send position information directly to the microcontroller ready for further processing. The GPS is also capable of streaming universal time and data (UTC) directly to your microcontroller for use in your application.

A set of jumper links and a patch system are installed which allow the GPS E-block to easily be set for use with any microcontroller device.

The upstream device (i.e. multiprogrammer) connected to this board must have an integrated UART module available, or the firmware must be able to send and receive TTL level RS232 compatible waveforms.

## 1. Features

- 20 channel GPS receiver module
- Min resolution longitude 2.2m
- Min resolution latitude 2m
- Altitudes of -300m to 18,000m
- Velocities up to 515m/s
- Pulse per second output
- Fully compliant with all GPS satellites
- Battery backup for instant on operation
- 3.3V or 5V operation



## Circuit description

The circuit as can be seen on page 6, is made up of four main components: the patch system, the voltage regulation, the backup battery and the GPS receiver.

### 1. Patch system

The design of this product enables you to use this board with many standard PICmicro devices. This is achieved by identifying the upstream device, then selecting the corresponding jumper setting on the GPS E-block. This will configure the board with the correct pin-out for the microcontroller selected. Jumper setting A, B and C are

used for selecting the appropriate pins for RX and TX: the dedicated RS232 lines. Jumper settings 1 and 2 are used to set the correct pins for PPS and Sleep GPS signals.

The microcontroller that is being used determines which port and which jumper. For example, if a PIC16F877A is being used then the GPS board must be connected to Port C. The jumper settings on the EB056 should be set to B & 1. Please refer to the patch settings table on page 3 for details.

The Patch System allows the user to route RX, TX and PPS to any of the 8 input bits required. This allows great flexibility, as the user can then use a different device other than those specified in the table on page 3. When using the GPS board with upstream devices that are not mentioned in the above table, such as Atmel AVR® board or other processor boards, then the patch system will be required.

## 2. Voltage regulation

The GPS E-block requires a 3.3V supply to power the GPS receiver circuitry. The 3.3V supply can be taken from a 5V supply on a 5V system by setting jumper J2 to the 5V position. This enables the voltage regulator U1 to drop the supply voltage down to 3.3V. If you are using a 3.3v supply then the jumper J2 can be set to the 3V3 position to bypass the voltage regulator U1. The voltage shifter U2 is responsible for ensuring that all of the data signals are converted between the correct voltages. The chip converts the signals from the input voltage source +V to the output voltage source 3.3V. This operation is bidirectional so signals coming from the GPS module will be converted back from the 3.3V supply to the +V supply.

## 3. Backup battery

The backup battery supplies power to the SRAM and real time clock during powered down conditions, therefore enabling much faster positional acquisition times. The battery used should be a CR2032 coin cell - not included.

## 4. GPS receiver - UP500

The UP500 GPS receiver has several I/O that can be interfaced by a microcontroller device. PPS or Pulse Per Second is a signal used to synchronise with the satellite systems. The pulse occurs once a second and is available as a logic high for one microsecond. The UP500 also has a hardware serial UART that links to the UART onboard the interfacing microcontroller. The UP500's UART runs at a fixed baud rate of 9600 and outputs the GPS signals in a NMEA format. For details regarding the content of the NMEA messages please refer to the NMEA standards datasheet. For more information on the modes and operations of the UP500 module please refer to the device datasheet, which can be found at: [www.fastraxgps.com](http://www.fastraxgps.com)

## 5. 3.3V operation

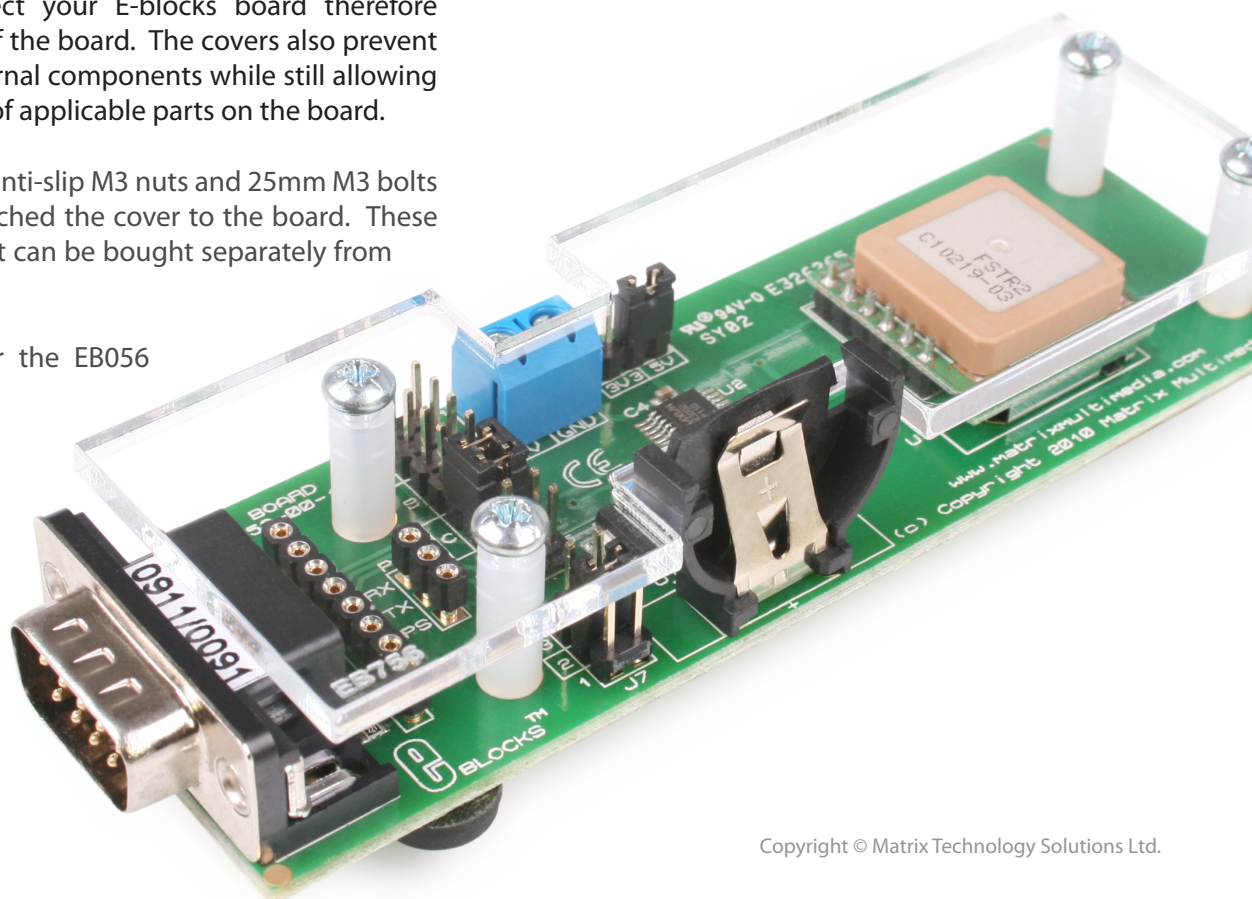
The EB056 GPS E-block is fully compatible with 3.3V systems.

# 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.

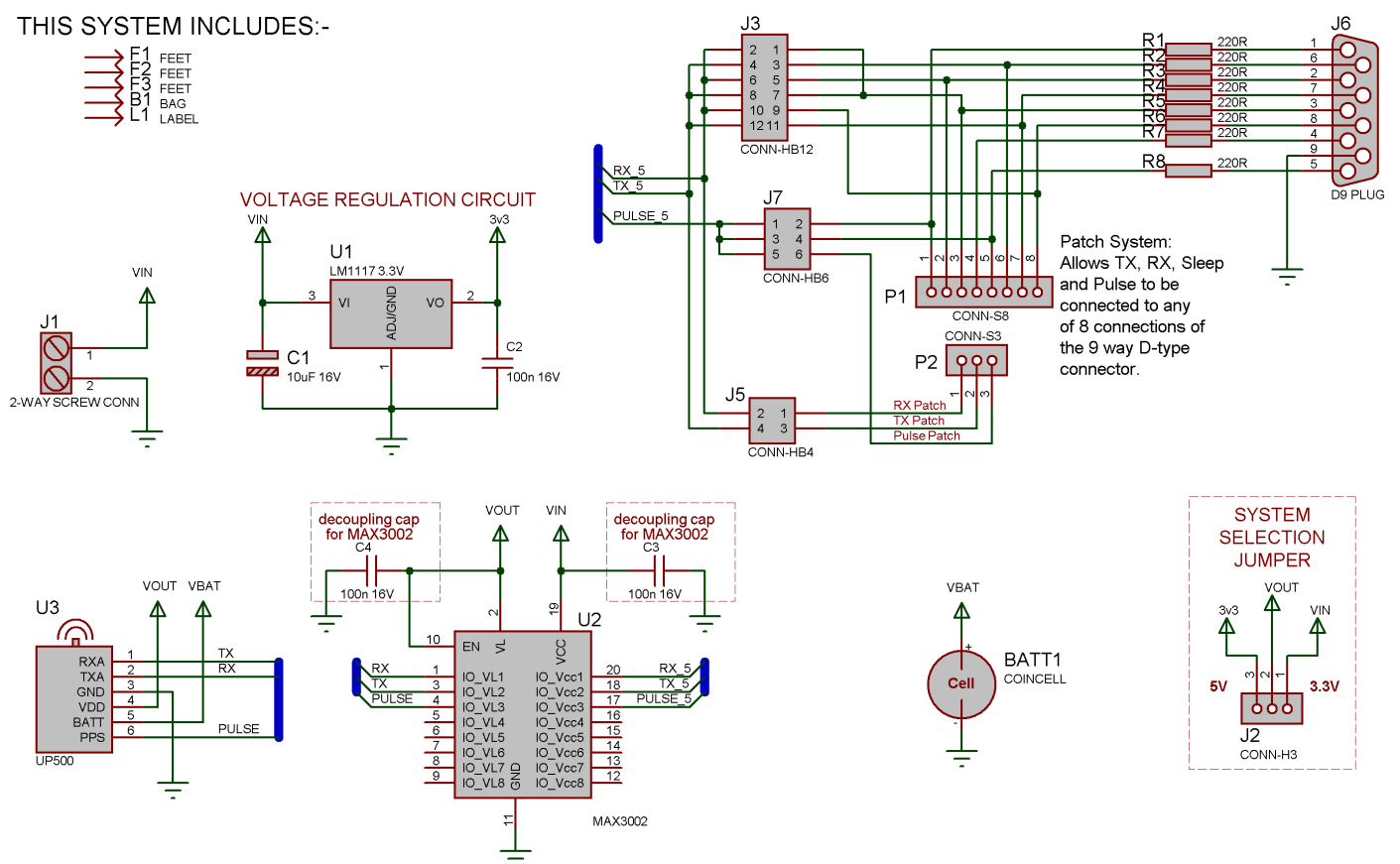
12mm M3 spacers, anti-slip M3 nuts and 25mm M3 bolts can be used to attached the cover to the board. These are not included but can be bought separately from our website.

The order code for the EB056 GPS is EB756.



# Circuit diagram

THIS SYSTEM INCLUDES:-





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EB056-30-1