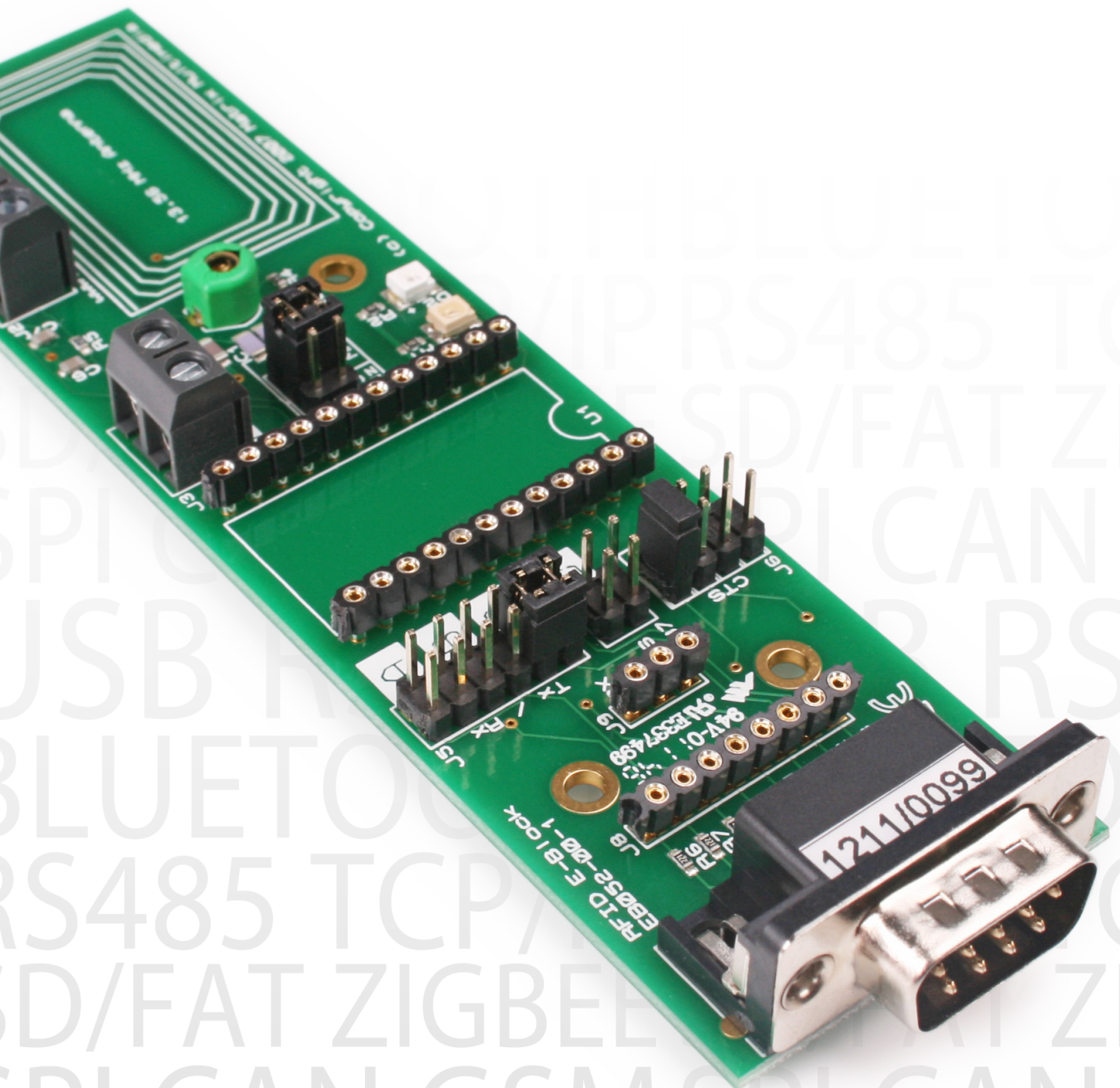


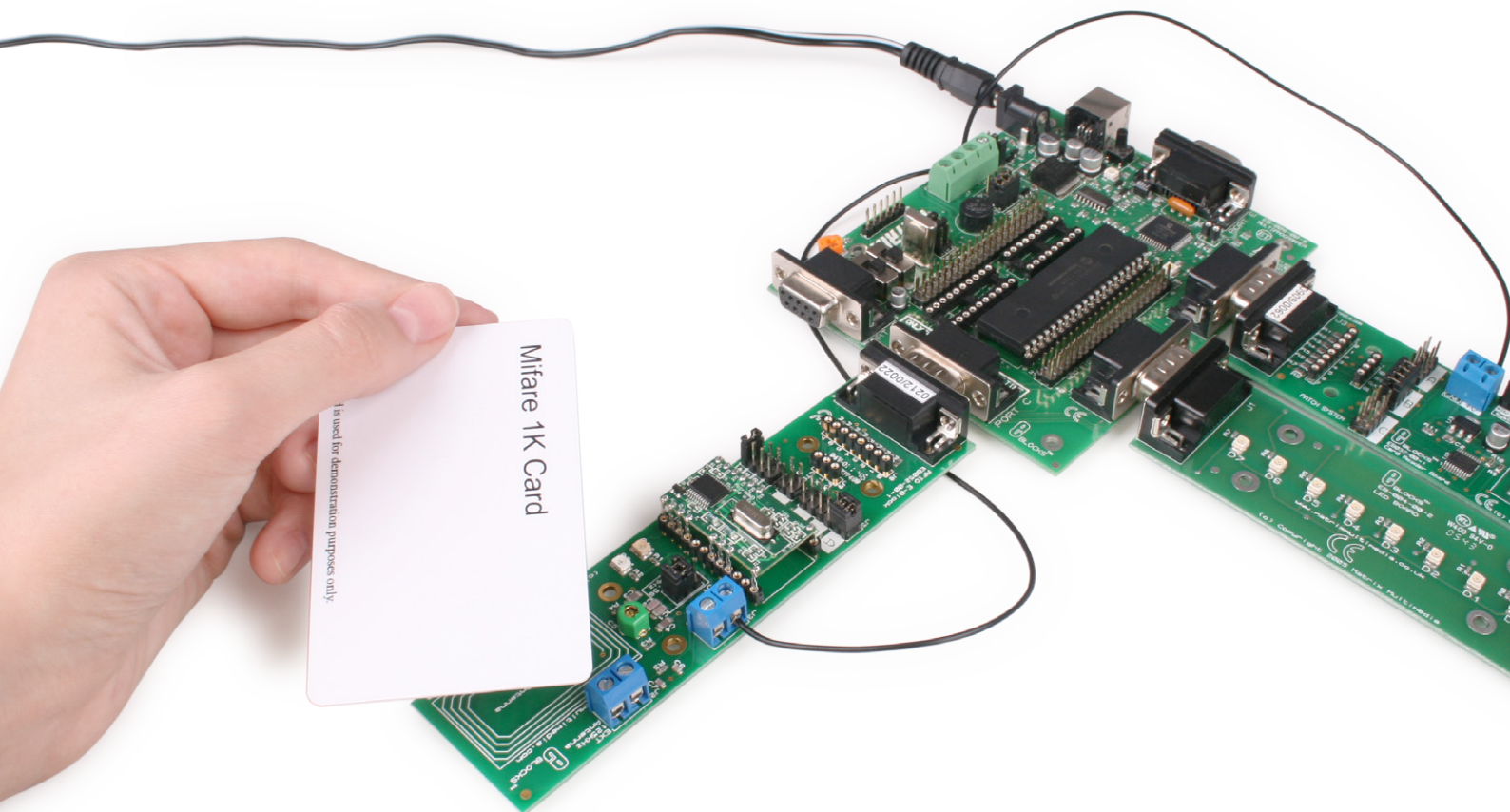
EBLOCKS[®]

RFID board



Contents

About this document	3
Board layout	3
General information	4
Circuit description	6
Protective cover	6
Circuit diagram	7



About this document

This document concerns the EB052 E-blocks RFID board.

1. Trademarks and copyright

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

2. Disclaimer

The information provided within this document is correct at the time of going to press. Matrix Multimedia 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

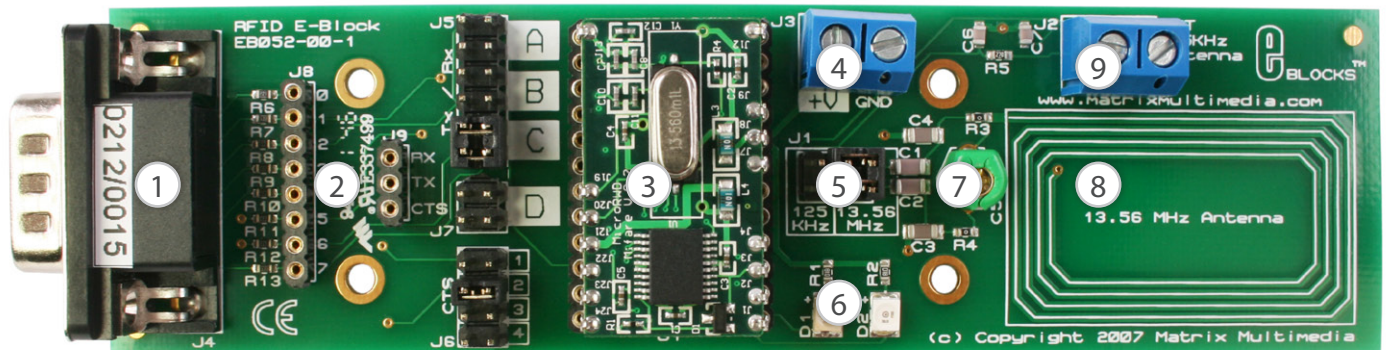
for all E-blocks, which can be found in the Support section of the website.

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. Patch system

3. RFID module

4. Power terminals

5. Frequency / antenna select

6. Status LEDs

1. Red LED flashing - antenna needs tuning

2. Red LED stable - antenna tuned correctly

3. Green LED stable - RFID device detected and connected

7. Sensitivity tuning capacitor

8. Onboard 13.56MHz antenna

9. External 125KHz antenna connector (not fitted as standard)

General information

The EB052 RFID E-block provides a RFID interface that can communicate with all common RFID devices running at either 125KHz or 13.56MHz. RFID stands for Radio Frequency Identifier. RFID is a means of tagging items such as stock items. A good example of this is the use of RFID in stores to detect theft. The RFID E-block interfaces RFID devices, also known as 'tags', through a high frequency radio wave. This radio frequency burst acts as a dual function: to simultaneously provide power to the RFID device, and to communicate with the device. RFID devices or tags can have internal peripherals such as EEPROM, Flash and can even encrypt data to industrial standards.

1. Features

- RFID wireless communications
- Flowcode macros available
- 125KHz or 13.56MHz operating frequency (125KHz RFID module and antenna available separately)
- Onboard 12.56MHz PCB antenna
- Status LEDs
- Tuning capacitors
- Range of approx. 10cm

2. RFID compatibility

See tables below.

13.56MHz RWD-ICODE RFID module (module supplied as standard)

Transponder type	Memory size (total/user)	Baud rate	Security	Key feautes
MIFARE 1K	1024 / 768	Up to 106K	Yes	R/W secure, card, payment, access
MIFARE 4K	4096 / 3456	Up to 106K	Yes	R/W secure, card, payment, access
Ultralight	64 / 48	Up to 106K	No	R/W low cost, payment
ICODE SLI	128 / 112	Up to 53K	No	R/W low cost, asset tracking, smart labels

125KHz RWD-QT (module sold separately)

Transponder type	Memory size (total/user)	Baud rate	Security	Key feautes
HITAG 1	256 / 192	Up to 4K	Yes	R/W general purpose
HITAG S256/2048	256 / 256	Up to 4K	Yes	R/W general purpose
HITAG 2	32 / 16	Up to 4K	Yes	R/W secure access, asset tracking
EM4001/4102	8 / 5	Up to 4K	No	R access control
MCRF200/123	16 / 14	Up to 4K	No	R access control

Note: to use the 125KHz RFID devices you must order a separate 125KHz RFID module and external antenna.

3. 3.3V system compatibility

The RFID board requires a 5V supply.

4. Communications

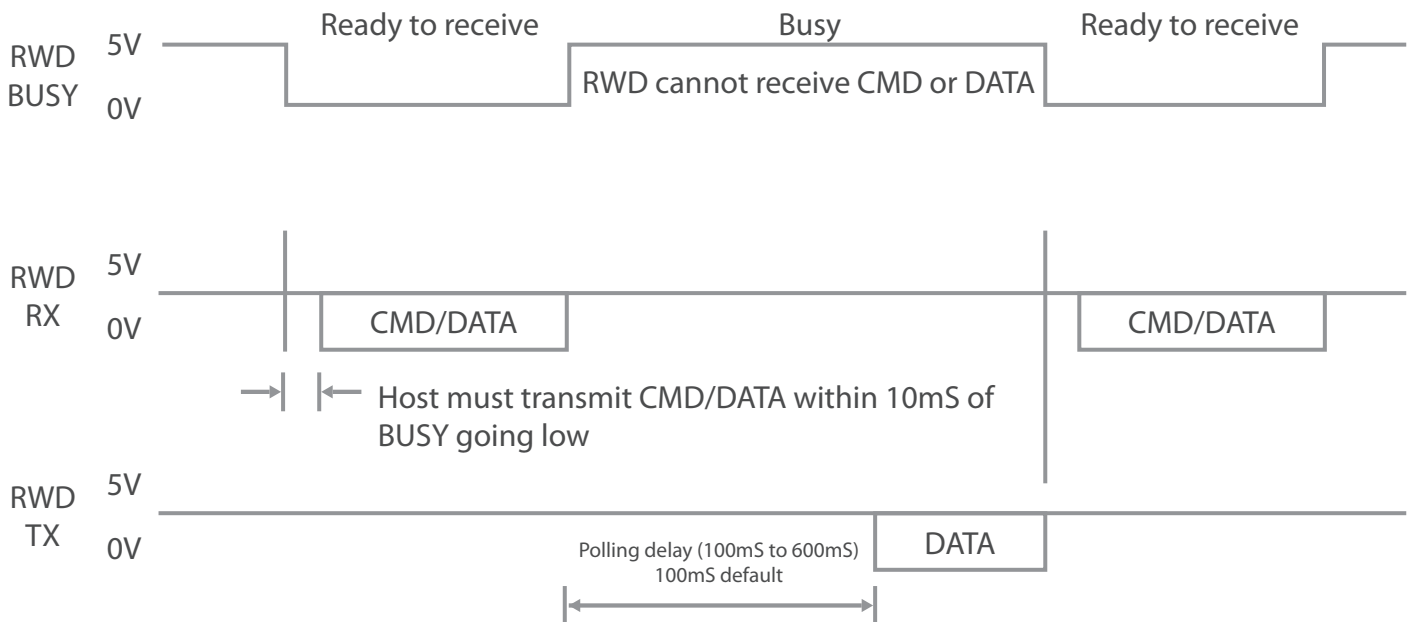
The RFID modules are configured by means of using a TTL level RS232 bus. This protocol requires a start bit, eight data bits and a stop bit.

The baud rate for the modules is set to 9600, with no parity, and there is also a flow control, CTS, line that can

be used.

On the next page is a functional diagram of the timing required by the RFID modules. The module is ready to receive data when the CTS line drops to logic zero. After sending the data you have to then wait at least 100ms before data will be transmitted back from the module.





5. Device command overview

12.56MHz RWD-ICODE RFID module (module supplied as standard)

Command	Command data	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Acknowledge
Card / label status	0x53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1FFFFFFX
Message report	0x7A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Produce and firm-ware string
Write EEPROM	0x50	EEPROM address	EEPROM data	N/A	N/A	N/A	N/A	N/A	1XXXFFXF
Store key	0x4B	Key code (0-31)	LS byte	Byte 2	Byte 3	Byte 4	Byte 5	MS byte	1XXXFFXF

The status flag returned by the acknowledge byte are as follows:

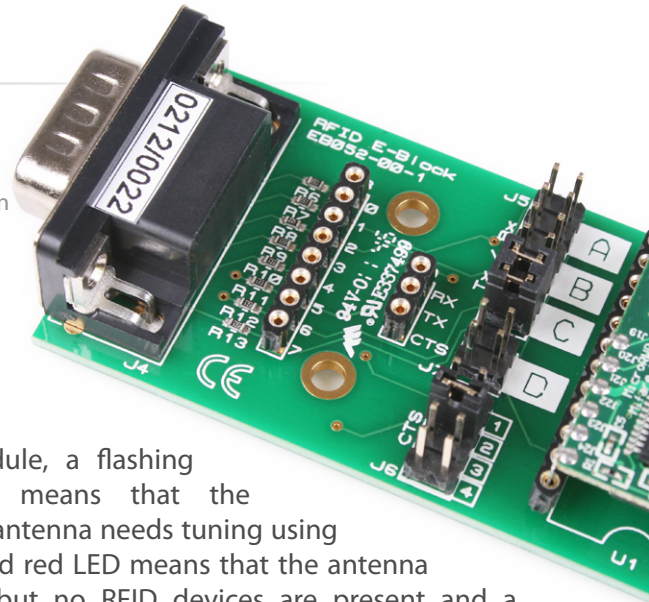
b7	b6	b5	b4	b3	b2	b1	b0	
1	1	1	1	1	1	1	1	
								EEPROM error (internal EEPROM write error)
								Card OK (card serial number matched to identity code list)
								Rx OK (card communication and acknowledgement OK)
								RS232 error (host serial communication error)
								MF type (0 = MF 1K byte card, 1 = MF 4K byte card)
								UL type (0 = MF standard 1K/4K card, SINGLE UID), 1 = MF ultralight card, DOUBLE UID)
								MFRC error (internal or antenna fault)

More commands can be found in the RFID module datasheet.

Circuit description

The circuit board consists of 3 digital I/O lines on a 'downstream' 9-way D-type plug. The patch system acts to route the transmit (TX), receive (RX) and clear to send (CTS) lines to the RFID module in a number of different configurations. The RFID module supplied with the board is a 13.56MHz device however this can be replaced by the 125KHz module that is available separately. The module's antenna is routed to the correct endpoint via jumper J1. In the 13.56MHz mode the onboard PCB antenna must be connected to the RFID module, tuning capacitor C5 is used to tune the module to the antenna. When using the 125KHz module the jumper J1 must be in the 125KHz position which routes the antenna signals to the external antenna screw terminals (not fitted as standard). The LEDs on the board show the status of the

Example configuration for the PIC16F877A



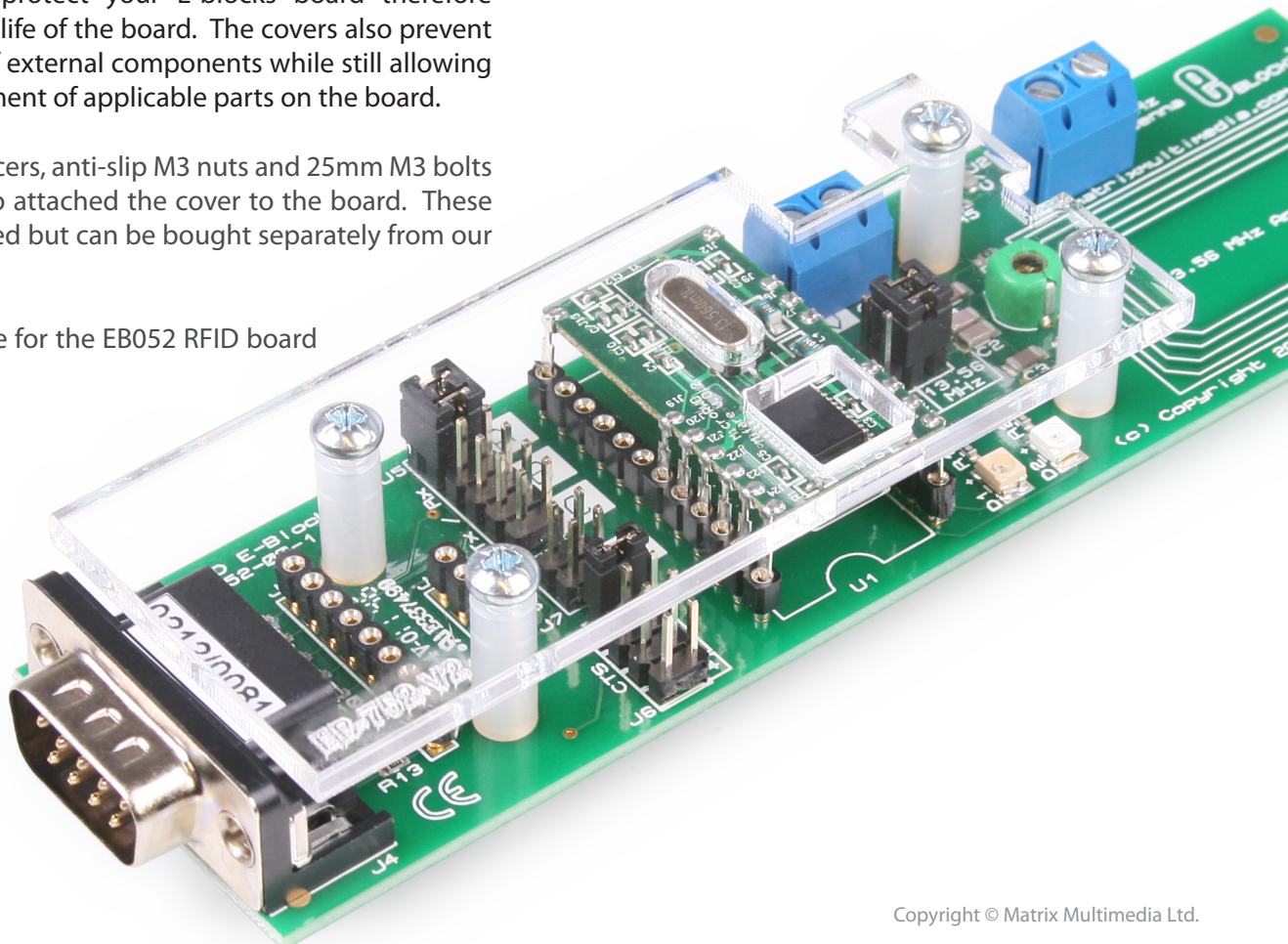
RFID module, a flashing red LED means that the module's antenna needs tuning using C5. A solid red LED means that the antenna is tuned but no RFID devices are present and a green LED indicates that an RFID device is present and connected.

Protective cover

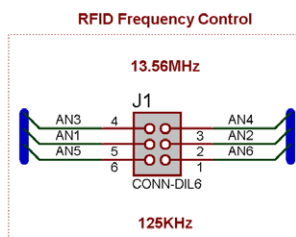
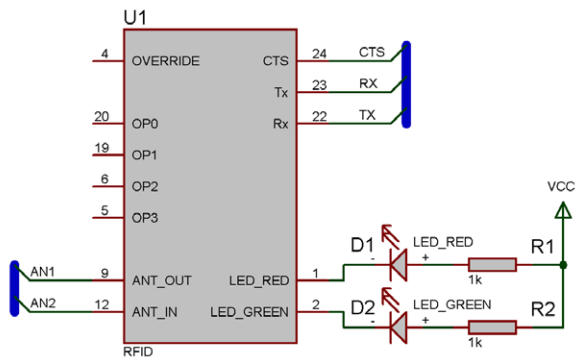
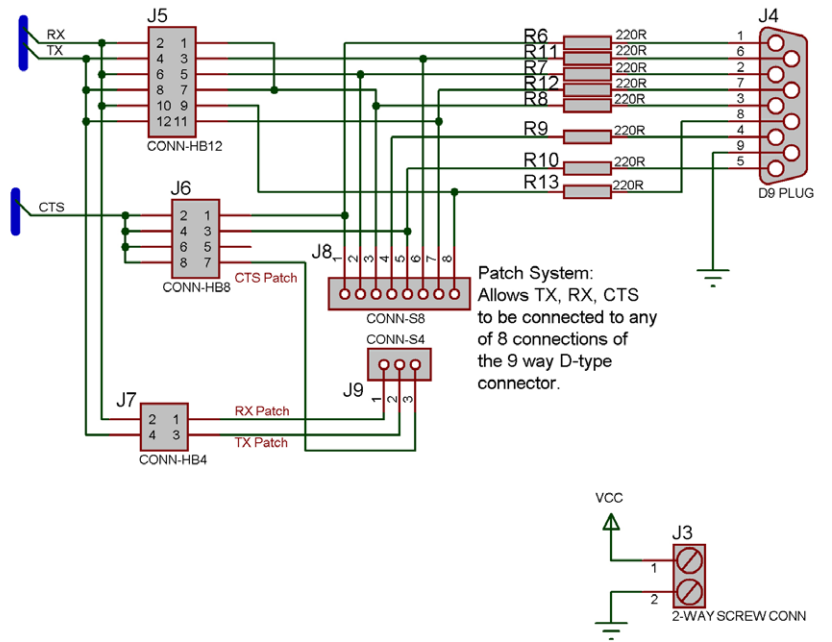
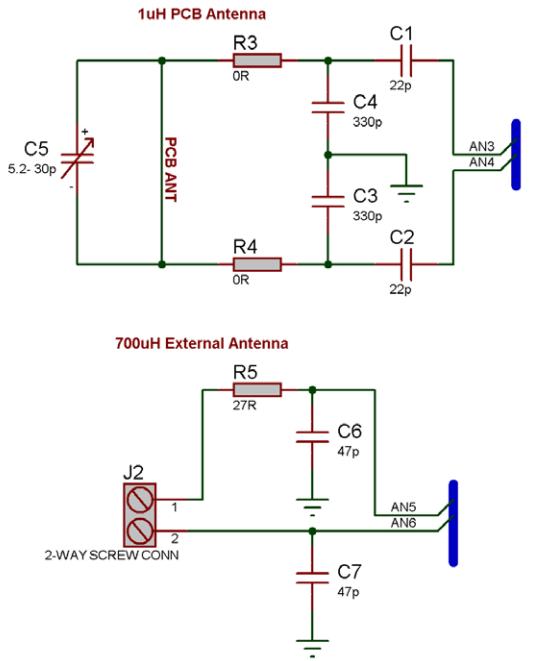
Most of the boards in the E-blocks range can be fitted with a plastic cover as an optional extra. These covers are there to protect your E-blocks board therefore extending the life of the board. The covers also prevent the removal of external components while still allowing for the adjustment of applicable 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 EB052 RFID board is EB752.



Circuit diagram





Matrix Ltd.
The Factory
33 Gibbet Street
Halifax, HX1 5BA, UK

t: +44 (0)1422 252380
e: sales@matrixmultimedia.co.uk

www.matrixmultimedia.com

EB052-30-1