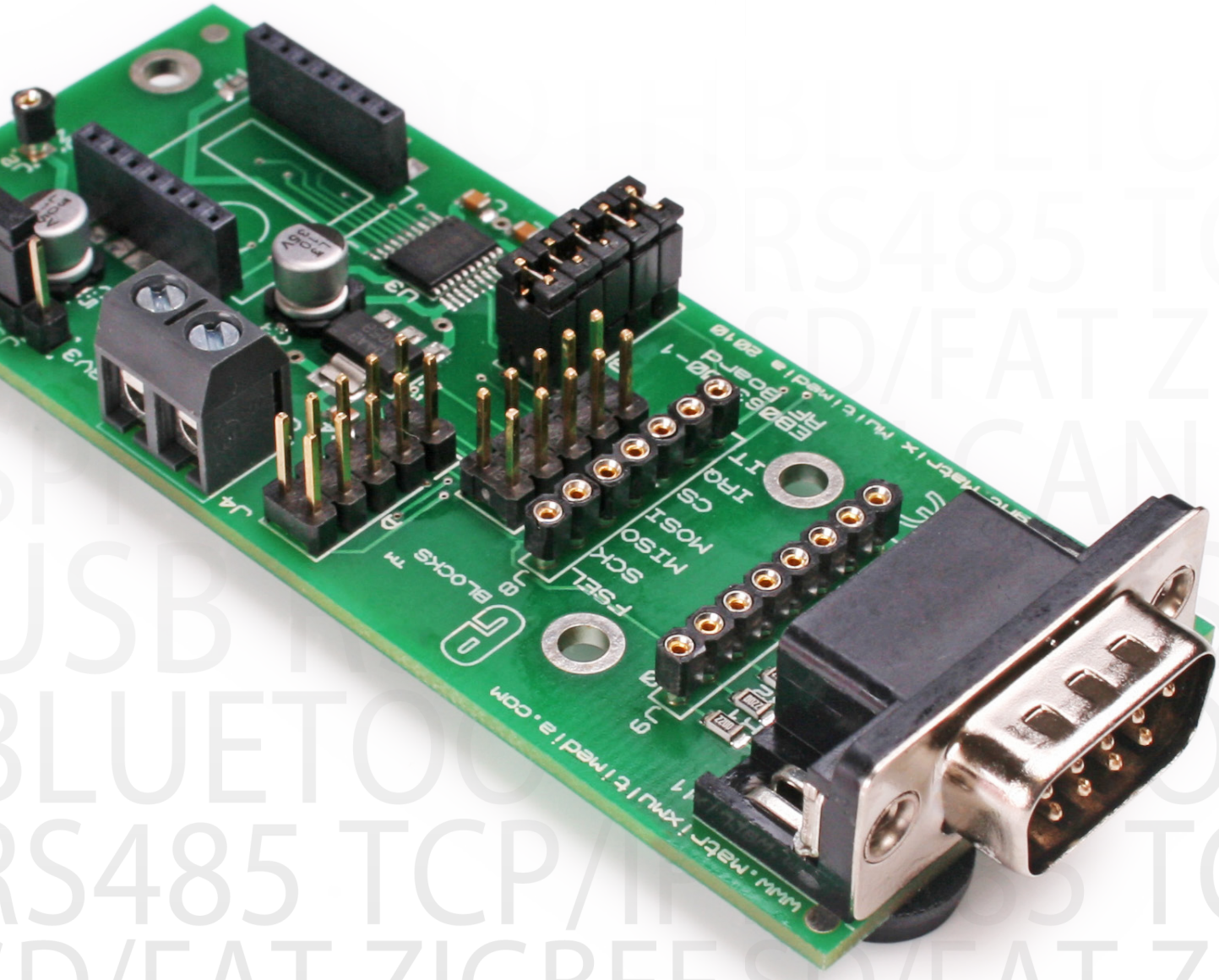
MATRIX

eBLOCKS®

433/868/915MHz RF board



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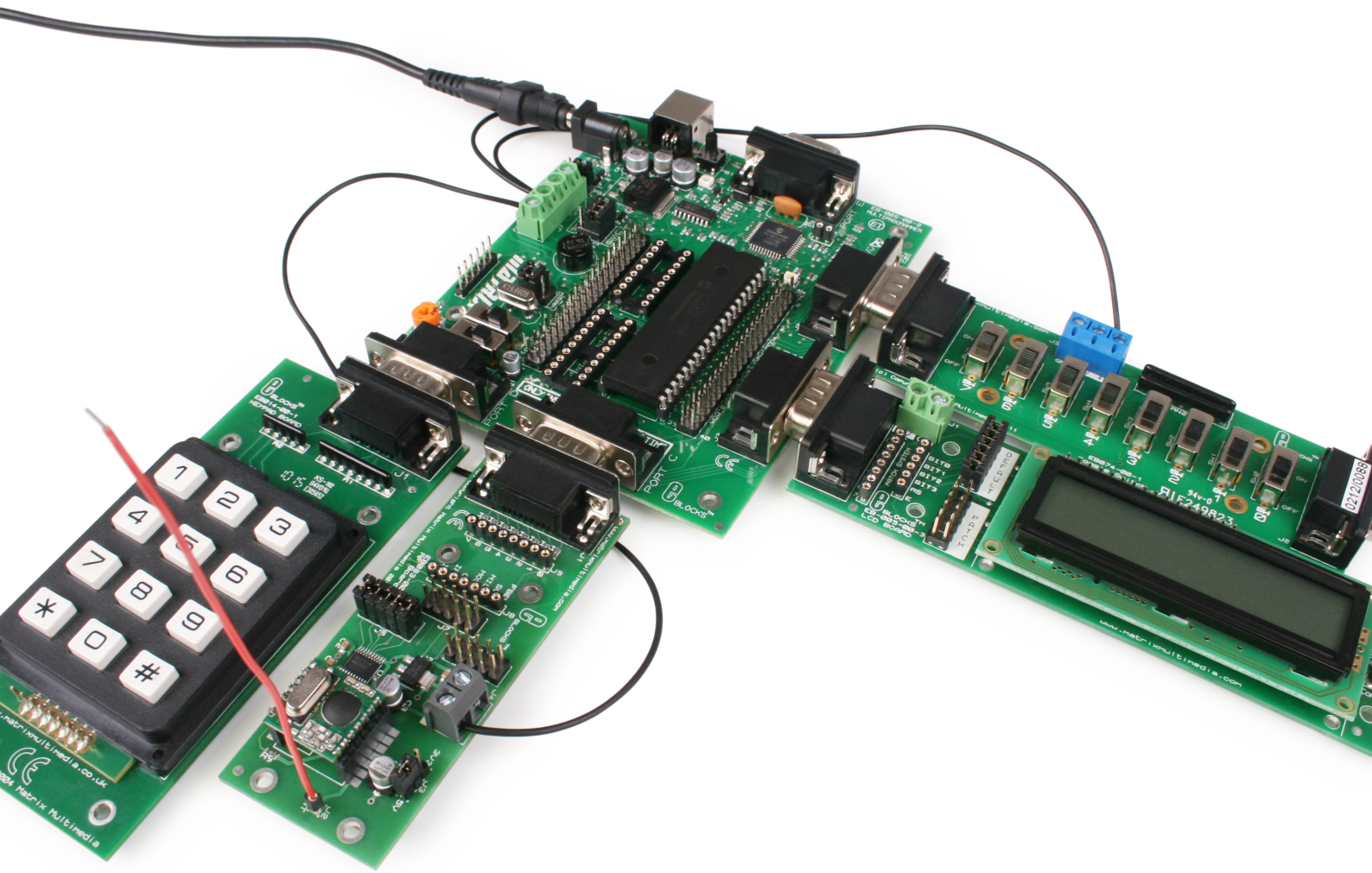


About this document

This document concerns the EB063 E-blocks 433/868/915MHz RF 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

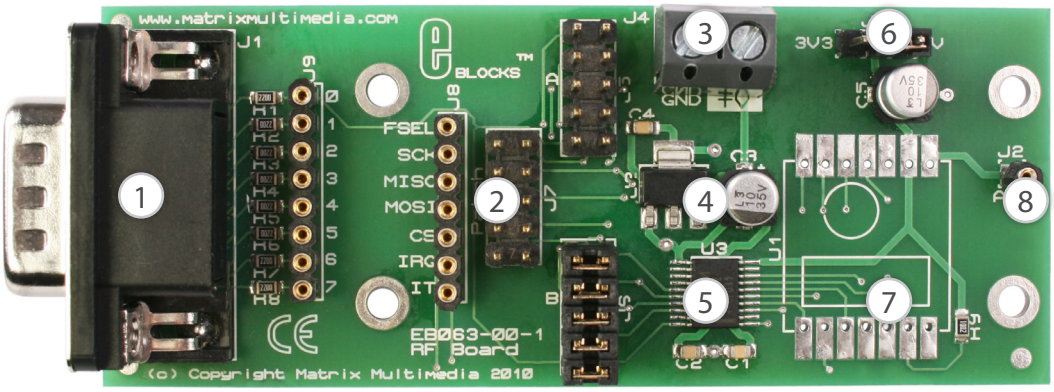
It is advisable to test the product upon receiving it to ensure it works correctly. Matrix provides test procedures for all E-blocks, which can be found in the Support section of the website.

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. Patch system
3. +V screw terminal
4. 3.3V voltage regulator
5. Voltage shifter IC
6. Input voltage control jumper
7. RF driver modules
8. Antenna socket

Please note that the IRQ and IT signals are not required by the Flowcode RF component and as such they are not routed through via the standard jumper based patch system. These pins however are available on the E-block as part of the turned pin wiring patch system should you wish to implement receive or transmit interrupts in your custom program.

	Jumper A (16F88)	Jumper B (16F877A)	Jumper C (Patch)
SCK	BIT4	BIT3	PATCH
MISO (SDI uC)	BIT1	BIT4	PATCH
MOSI (SDO uC)	BIT2	BIT5	PATCH
CS	BIT0	BIT0	PATCH
FSEL	BIT3	BIT1	PATCH
IRQ	PATCH	PATCH	PATCH
IT	PATCH	PATCH	PATCH

General guide for patch settings

General information

This E-block provides a radio frequency interface that can be used to facilitate communication between microcontrollers and third party devices like R/C vehicles or wireless products such as doorbell controls etc. The E-block can also be used to communicate with other RF E-blocks.

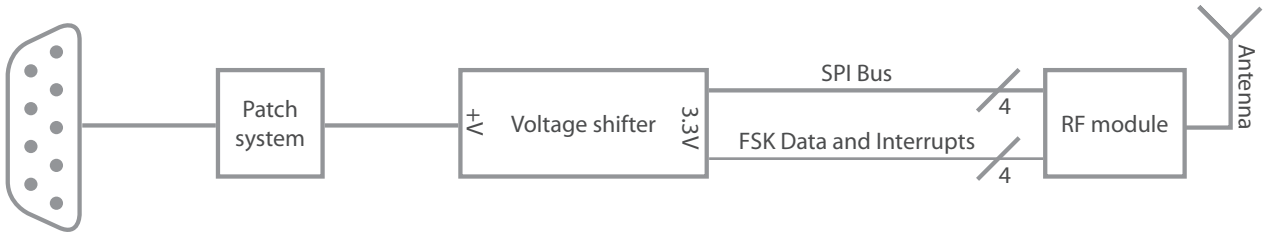
3 different RF frequencies are available to allow you to choose a frequency that is legal for use in your area. A general rule of thumb is that 433MHz is Europe, 868MHz is America and 915MHz in Asia but this is not strictly the case. Please check the RF rules in your area to ensure you obtain the correct module frequency.

A set of jumper links are available which allow the RF E-block to easily be set for all microcontroller port configuration.

Flowcode macros that make this device easier to use are available.

1. Features

- E-blocks compatible
- 433 / 868 / 915MHz versions available
- High data rate up to 115.2kbps
- Transmission distances of up to 300m
- Multiple distinct RF channels
- Adjustable receiver bandwidth
- Adjustable transmitter frequency deviation
- 3.3V compatible



Circuit description

The design of this product enables you to use this device with many standard microcontroller devices. This is achieved by identifying the pins on the microcontroller, then by selecting the corresponding jumper setting on the RF board. This will allow you to configure the correct pin-out for any microcontroller device.

1. Voltage shifting

The voltage shifting circuitry use a MAX3002 IC to shift the voltage levels between the +V upstream I/O voltage and the downstream RF module 3.3V voltage. The IC is bidirectional so signals can be sent and received through the voltage shifter.

2. RF modules

The RF modules used on the R E-block is an Alpha RF transceiver from RF solutions. This is a pre-made module that is tailored to a single operating frequency only. Therefore it is good to know which country you will be using the modules in and therefore which operating frequency you will need. The RF module uses a MRF49XA transceiver chip for Microchip so a full list of the module features and registers can be found by looking at the datasheets for the two products mentioned above.

3. Antenna design

	433MHz	868MHz	915MHz
Antennas wire length	173mm	86mm	82mm

General guide for ¼wave antenna length

Single core wire should be cut to the correct length and about 5mm of insulation should be stripped from one end of the wire. The bare end of the wire can then be inserted into the antenna socket on the board marked ANT J2 and used as the RF antenna. The wire can be relatively straight or can be coiled around a pencil or a nail etc. before being connected to the board. The measurements provided above are for a ¼ wave antenna though other antenna lengths such as ½ wave of full wave loop can also be used. ¼ wave means that the antenna

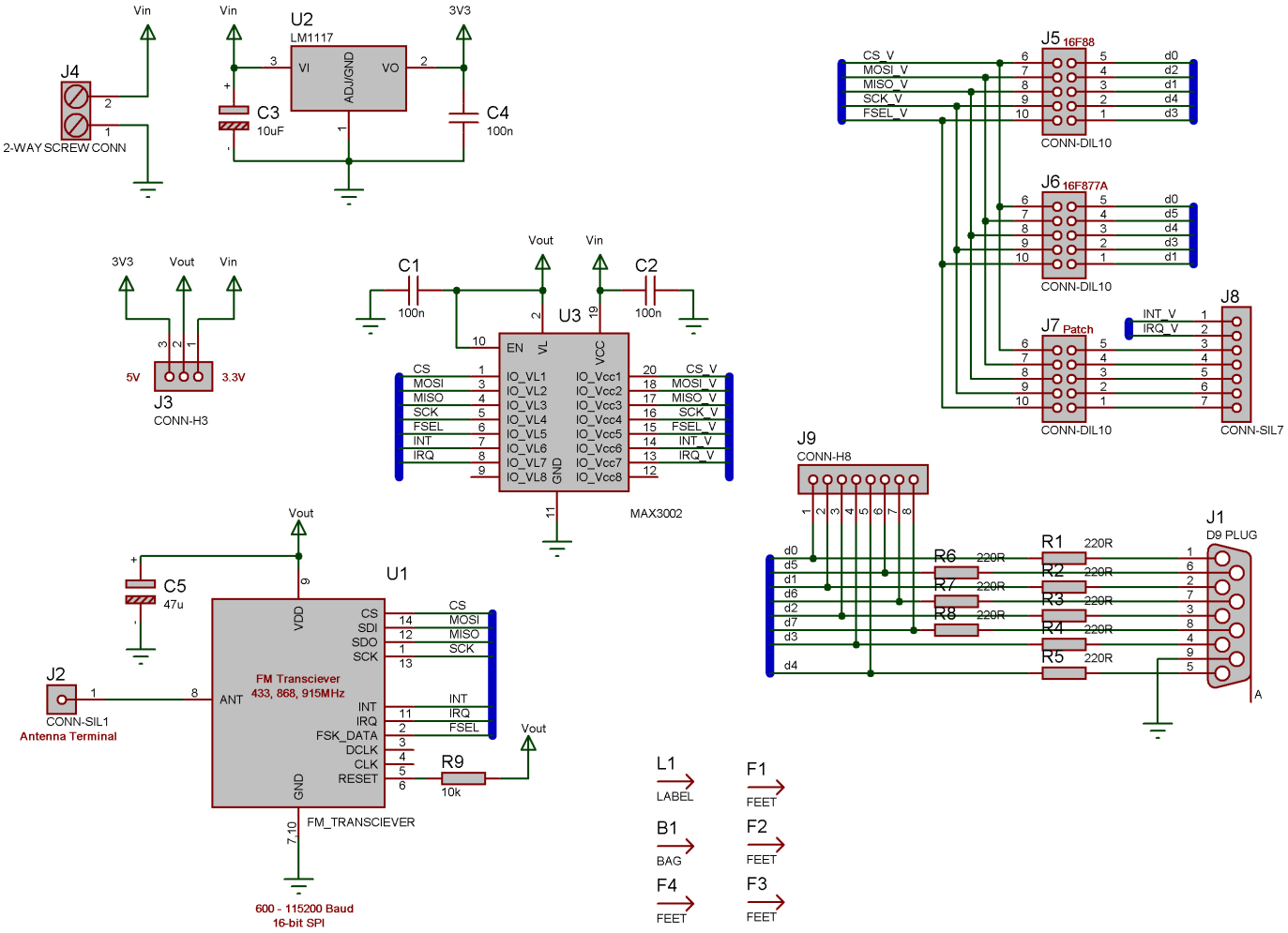
is long enough to absorb ¼ of the RF wave as it travels though the air at the speed of light. A 433MHz wave has a time period of about 2.3 nanoseconds (1/433,000,000) so a quarter of this is roughly 0.577ns. Travelling a the speed of light for this length of time works out to be roughly 173mm.

4. 3.3V operation

This board is fully compatible with upstream boards operating off 3.3V.

Note: Damage to the RF module may occur if the board is powered with a voltage other than 3.3V when the voltage selection jumper is in the 3.3V position.

Circuit diagram



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

t: +44 (0)1422 252380
e: sales@matrixtsl.com

www.matrixtsl.com

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