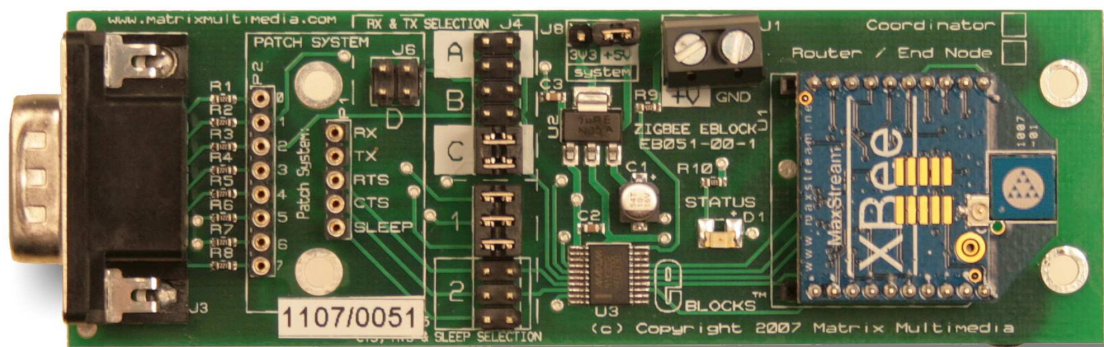


Zigbee board datasheet

EB051-00-1



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1. About this document

This document concerns the E-blocks Zigbee boards with codes EB051C and EB051R version 1.

The order code for the Zigbee Coordinator product is EB051C.

The order code for the Zigbee Router / End Device product is EB051R.

1. Trademarks and copyright

PIC and PICmicro are registered trademarks of Arizona Microchip Inc.

E-blocks is a trademark of Matrix Multimedia Limited.

2. Other sources of information

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

Getting started with E-Blocks.pdf EB355

This describes the E-blocks system and how it can be used to develop complete systems for learning electronics and for PICmicro programming.

3. Disclaimer

The information in this document is correct at the time of going to press. Matrix Multimedia reserves the right to change specifications 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 testing section of this document first. You will find the latest software updates, FAQs and other information on our web site: www.matrixmultimedia.com . If you still have problems please email us at: support@matrixmultimedia.co.uk.

2. General information

1. *Description*

Provides a Zigbee node interface that can connect to or create a Zigbee network.

EB051C – Coordinator Zigbee node, used to start, configure the network and allow other nodes to join.

EB051R – Router / End device node, used to connect and communicate to networks started by a EB051C.

Zigbee is a software-based protocol that sits on top of the 802.11 RF wireless devices standard similar to Bluetooth. Unlike Bluetooth, Zigbee is capable of forming large networks of nodes and boasts advanced features such as mesh networking, simple addressing structures, route detection, route repair, guaranteed delivery and low power operation modes.

The EB051 Zigbee E-Blocks are fully compliant with both the Zigbee pro (07) and ZNET (08) Zigbee standards. The boards can be used create a network of dynamic moveable Zigbee nodes, or to interface with an existing Zigbee network.

Zigbee provides a transparent layer for sending and receiving data from the network. Therefore once the module has been configured and assigned to the correct address then sending and receiving data is as simple as sending and receiving RS232 bytes through the chip's UART.

2. *Features*

- Zigbee Wireless communications
- Flowcode macros available
- Compatible with global RF standards
- Onboard Zigbee module
- Status LED
- Full 2007 Zigbee Pro / ZNET compliance
- 128-bit AES Encryption
- Range of approx 100m per node

3. *Zigbee Operation*

The Zigbee boards use a V2 XBEE module to interface to the Zigbee network. These modules are compliant with the 2007 Zigbee Pro / ZNET standard.

The V2 XBEE modules come in two varieties. One is configured to be the Zigbee network coordinator (EB051C) and the other is configured to be either a router node or an end device node (EB051R). The variety of the module is marked at the top right hand side of the Zigbee board.

- Coordinator nodes are responsible for creating the Zigbee network and allowing other Zigbee nodes to join. Only one coordinator node can exist on any single network.
- Router nodes are responsible for routing signals to other routers or to end nodes.
- End device nodes are responsible for collecting or depositing real world data to and from the Zigbee network.

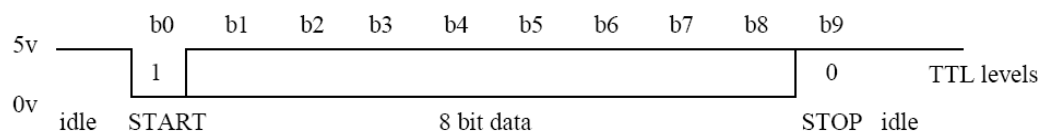
The Coordinator node and Router nodes are capable of handling up to eight children devices. The children devices can consist of either other Router nodes or End device nodes. If an End device node is configured to sleep then the parent device associated for that node will be responsible for buffering any incoming data. Therefore if you are using sleeping End devices you must make sure to poll the parent for data every time the device comes out of sleep mode.

4. 3.3V system compatibility

The board is compatible with 3.3V and 5V systems.

5. Communications

The XBEE modules are configured by means of using a TTL level RS232 bus to send and receive AT commands. This protocol requires a start bit, eight data bits and a stop bit.



The baud rate for the XBEE modules is set to 9600, with no parity and flow control lines RTS and CTS that can be used. AT commands are strings of ASCII data that are sent over the RS232 bus. For more information on the AT commands used by the XBEE module please refer to the V2 XBEE datasheet.

Example AT command

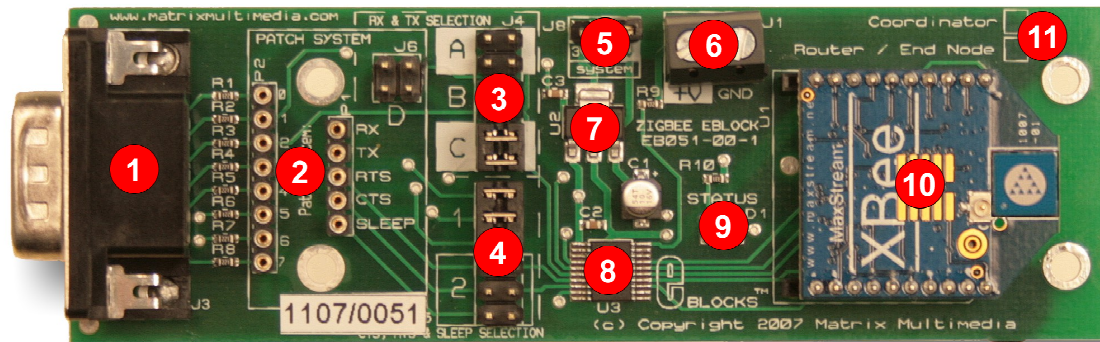
ATID 234 - Assigns a personal area network identifier of 0x234 or 564 in decimal.

6. V2 XBEE Module

For further data regarding the XBEE module please visit the following link.

www.matrixmultimedia.com/datasheets/XBEEV2.pdf

Board layout



EB051-74-1.cdr

- 1) 9 Way D-type Plug
- 2) Patch system
- 3) Rx and Tx UART routing selection
- 4) CTS, RTS and SLEEP routing selection
- 5) Input supply voltage select
- 6) Input supply voltage screw terminals
- 7) 3.3V regulator
- 8) Voltage level shifter
- 9) Status LED
- 10) XBEE Zigbee module
- 11) Coordinator / Router / End device marking.

3. Testing this product

The following program will test the circuit board's communication with the XBEE module. For further tests to test the XBEE modules RF operation you will require at least 1 EB051C and 1 or more EB051R Zigbee boards. The test file can be downloaded from www.matrixmultimedia.com.

1. **System Setup**

Multi-programmer board (EB006) with:

EB006 Options	Setting
Power supply	External, 14V
PICmicro device	16F877A
SW1 (Fast/Slow)	Don't care
SW2 (RC/Xtal)	Xtal
Xtal frequency	19.6608MHz
Port A	
Port B	LCD board EB005
Port C	Zigbee board EB051
Port D	
Port E	
Test program	Zigbee.hex

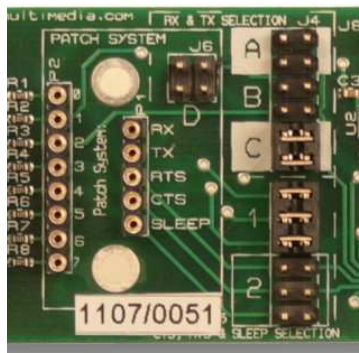
- 1 Ensure that the Multiprogrammer is in correct configuration
 - Fast mode (SW1 towards the center of the board)
 - XTAL mode (SW2 towards the center of the board)
 - Ensure that a 19.6608MHz crystal is inserted in the Multiprogrammer board
- 2 Insert the LCD board (EB-005-00-1) into Port B of the Multiprogrammer
- 3 Connect wire from "+V" of LCD board to "+V" of Multiprogrammer
- 4 Program the a PIC16F877A with the test program Zigbee.hex
- 5 Insert the Zigbee board into Port C of the Multiprogrammer
- 6 Insert the XBEE module into the socket on the Zigbee board
- 7 Connect power to the Zigbee board via the "+V" screw terminals
- 8 Make sure jumpers "C" and "1" are selected on the Zigbee board.
- 9 Press the reset button on the Multiprogrammer.
- 10 The word "Testing" should appear on the LCD screen.
- 11 The LED in position D1 should start flashing.
- 12 If the word OK appears on the LCD then testing is successful.
- 13 Otherwise if an error message is displayed or the LED is not flashing then the test has failed.

4. Circuit description

1. Description

The circuit board consists of 5 digital I/O lines on a ‘downstream’ 9-way D-type plug. This routes the transmit (TX), receive (RX), clear to send (CTS), request to send (RTS) and sleep (SLEEP) lines to the XBEE Zigbee module.

Example of jumper settings C and 1, configured for use with a PIC16F877A.



RX and TX jumper settings.

Jumper Setting A	Jumper Setting B	Jumper Setting C		Jumper Setting D
		PIC 16F Devices	PIC 16C Devices	
PIC16F87	PIC16F627/A	PIC16F73	PIC16C63	PATCH SYSTEM
PIC16F88	PIC16F628/B	PIC16F737	PIC16CR63	
	PIC16F648A	PIC16F74	PIC16C65/A/B	
		PIC16F746	PIC16RC65	
		PIC16F76	PIC16C66	
		PIC16F767	PIC16C73/A/B	
		PIC16F77	PIC16C74/A/B	
		PIC16F777	PIC16C745	
		PIC16870/1	PIC16C765	
		PIC16F873/A	PIC16C77	
		PIC16F874/A	PIC16C773	
		PIC16F876/A	PIC16C774	
		PIC16F877/A		

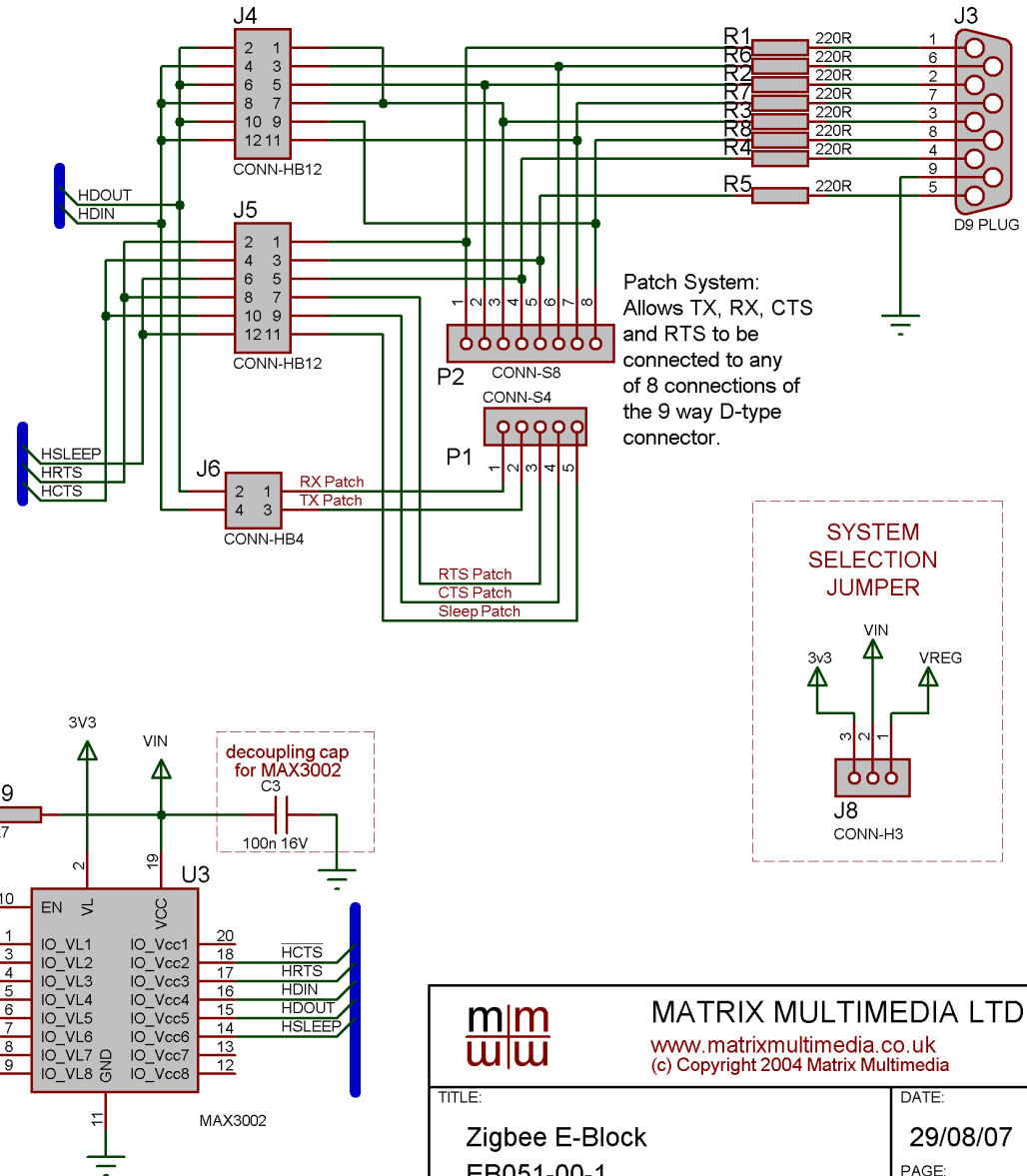
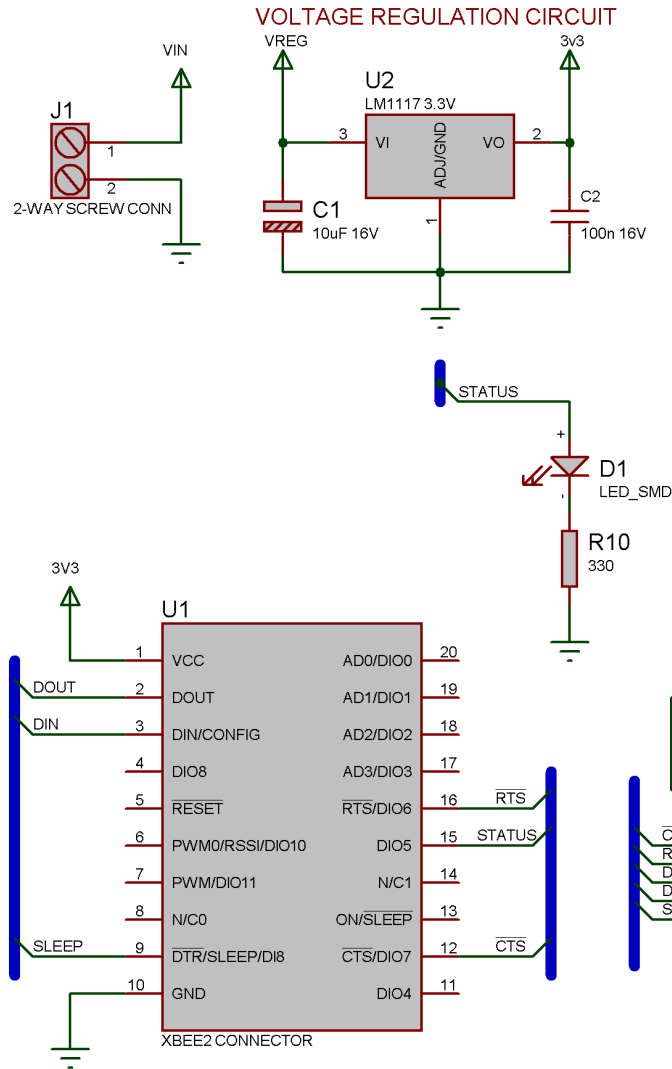
CTS, RTS and Sleep jumper settings.

Jumper Setting 1	Jumper Setting 2
RTS – Pin 0	PATCH SYSTEM
CTS – Pin 4	
SLEEP – Pin 3	

Appendix 1 – Circuit diagram

THIS SYSTEM INCLUDES:-

- F1 FEET
- F2 FEET
- F3 FEET
- B1 BAG
- L1 LABEL



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