Bluetooth board
EB024-00-2
Technical datasheet
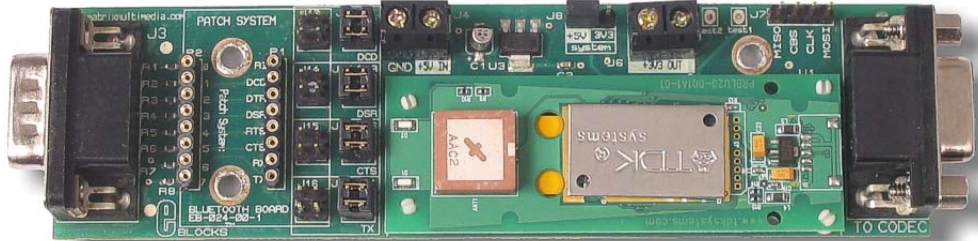
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Appendix 1   Circuit Diagram

1. About this document

This document concerns the E-blocks Bluetooth board code EB024 version 2.

The order code for this product is EB024.

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

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

PPP Help file

This describes the PPP software and its functionality. PPP software is used for transferring hex code to a PICmicro microcontroller.

C and assembly strategies

Not provided for this product.

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 troubleshooting 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. <u>General information</u>

Description

This E-blocks™ board contains a TDB BLU2i V2 module which adds Bluetooth functionality to your E-blocks system. The class 1 Bluetooth module has a transmit power of 6dBm which should give a 100 yard transmission range at a data transfer rate of 100Kbps. The module is programmed using the serial I^2C protocol, with an AT command superset, and can be interfaced to any microcontroller with a UART facility. The module is capable of supporting a range of Bluetooth protocols including LAP, Data, and the headset profile. A compatible E-blocks CODEC board for establishing headset audio transfer is available. Flowcode macros to support the use of this board are available.

Features

- E-blocks compatible
- Low cost
- Provides a Bluetooth interface for all your projects
- I^2C interface
- 100 yard range
- Supports most Bluetooth protocols

3. <u>Board layout</u>
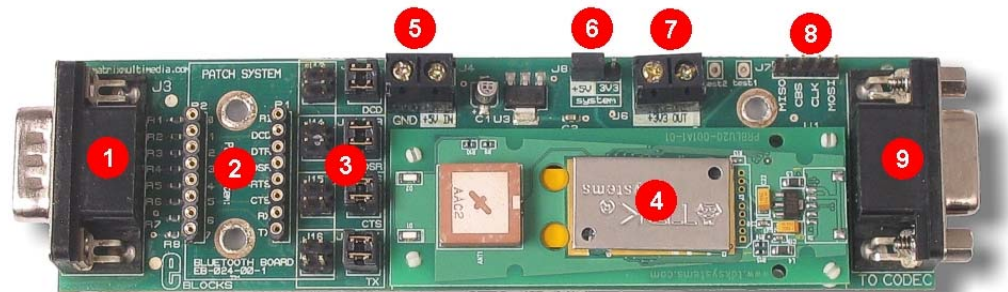
1. D-type E-blocks connector - to Programmer board
2. Patch system
3. Connection jumpers
4. BLU2i V2 module
5. Power in screw terminals - +5 Volts and Ground for EB024 power supply
6. operating voltage selector – 3.3V/5V voltage out selector
7. Power out screw terminal – for powering CODEC board and other peripherals.
8. BLU2i programmer connector
9. D-type E-blocks connector – to CODEC board

4. <u>Testing this product</u>

The following program will test the circuit. The test files can be downloaded from www.matrixmultimedia.com.

The following instructions explain the steps to test your USB232 board. The instructions assume that PPP is installed and functional. It also assumes that you are confident in sending a program to the PIC via the Multiprogrammer.

These programs require a PICmicro Multiprogrammer board (EB-006) with a 40-pin PIC16F877A device. They also require a PC with FTDI drivers installed, MProg 2.3 software, a spare USB port and Hyperterminal.

The program will enable you to fully test the functionality of the board.

1. System Setup

Master system:

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	Switch board EB007
Port B	LCD display EB005
Port C	Bluetooth board EB024
Port D	
Port E	
Test program	BT_MASTER.HEX

EB005 Options	Setting
J3,J4	DEFAULT

EB024 Options	Setting
J7	No link block
J8	5V
J13 / J9	J9 Horizontal
J14 / J10	J10 Horizontal
J15 / J11	J11 Horizontal
J16 / J12	J12 Horizontal
Address (set by software)	00809094BA05

Slave system:

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	Switch board EB007
Port B	LCD display EB005
Port C	Bluetooth board EB024

Port D	
Port E	
Test program	BT_SLAVE.HEX

EB005 Options	Setting
J3,J4	DEFAULT

EB024 Options	Setting
J7	No link block
J8	5V
J13 / J9	J9 Horizontal
J14 / J10	J10 Horizontal
J15 / J11	J11 Horizontal
J16 / J12	J12 Horizontal

Connect "+V" from the Screw terminal of the Switch board to "+V" of the Multiprogrammer, the LCV board, and the Bluetooth board – 5V input.

2. Test Procedure

1. Before the test unit has been connected, connect both systems as described and apply the power to the Master EB-006 E-Block and press "RESET" – "init..done" will be displayed on the Master LCD.
2. A series of dots on the Master LCD will show the progress of the Master System boot procedure. The message "setup" will indicate a successful boot, and then the screen will go blank.
3. Connect +5V to unit under test and then connect it to Port C of the Slave System. LED's on Bluetooth module will light briefly which indicate that the Module is 'alive'. Press "RESET" on the Slave EB-006.
4. "rx.done." will be displayed on the Slave LCD, then the screen will go blank and a series of dots will indicate progress. This will end with "connected", followed by the messages "sending…" and "press A0". This whole sequence should take approximately 10 seconds.
5. While this is happening, the Master LCD will display "PAIR 0 xxx", "RING xxx" and "CONNECT xxx" messages (where "xxx" is a 12-digit number), and finally "*Unit passed*". At this stage, both the Master and Slave Bluetooth modules will have D2 on the module lit.
6. Press "A0" on the Switch E-Block of the Slave System. This will reset the test unit. The Slave LCD should display "*** DONE ***" and the Master LCD should display "^^^" and "NO CARRIER". Also, the D2 LEDs on the Bluetooth modules should turn off.
7. Remove the test EB-024 unit from the Slave System and repeat the above from step 3. There is no need to re-boot the Master System, although the Master LCD display can be cleared by pressing A0 on the Master Switch E-Block if required.

3. Possible problems

1. If the Slave Bluetooth module does not have power (or is not working for any reason), the Slave LCD will display "rx.done.f0" at step 4.
2. If the Master System boot fails, the LCD will display "init.done" and the screen will go blank. The progress dots will not appear.
3. If the Slave module fails to "discover" the Master module, the Slave display will stall at 4 dots and finally a message "error 6" will be displayed. Possible causes are that the Master Bluetooth module…
    i. …is no longer powered
    ii. …has not completed boot-up successfully
    iii. …is not the one with address "00809094BA05"
    iv. …remains connected to another Bluetooth module (the D2 LED will be on)
4. Reset the Master System and wait for a successful boot-up to recover.
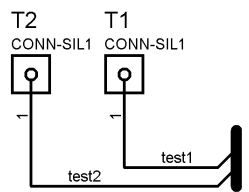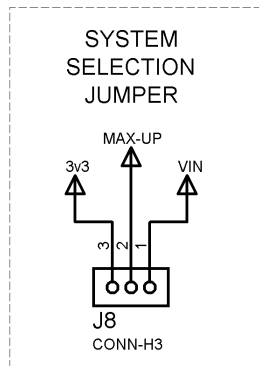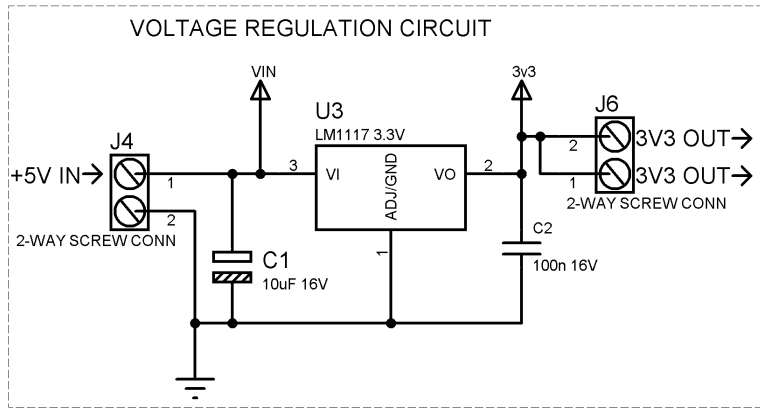
5. <u>Circuit description</u>

Max 3002 Chip
Coverts the 5V I/O from the PICmicro Multiprogrammer in to 3.3V for the Codec board.

U1 Blui Connector
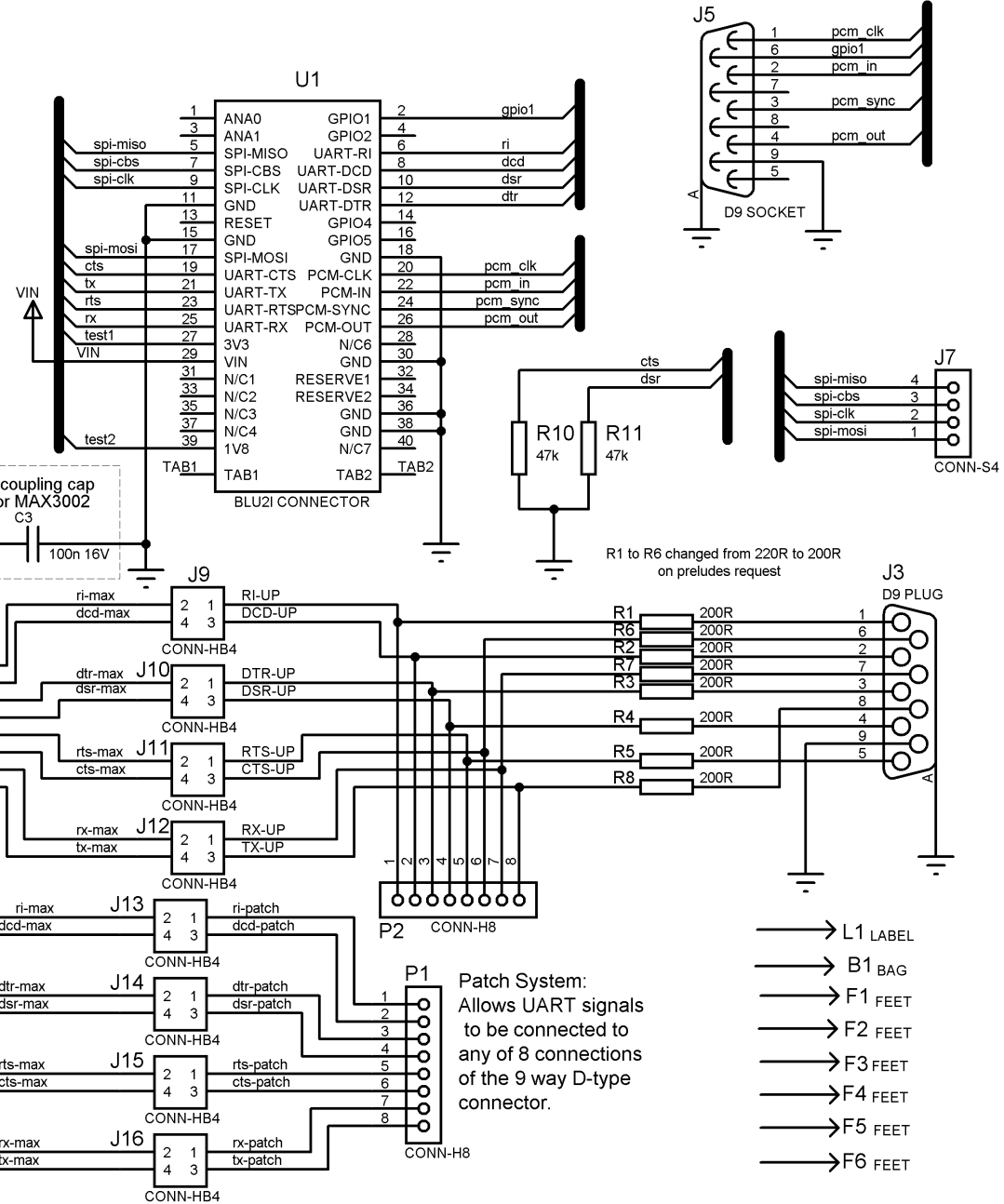Connects the Blui V2 Bluetooth Module to the Circuit Board

Appendix 1 – Circuit diagram

VOLTAGE REGULATION CIRCUIT

VIN
3v3

U3
LM1117 3.3V
VI   VO
ADJ/GND

J4
+5V IN→   1
           2
2-WAY SCREW CONN

C1
10uF 16V

C2
100n 16V

J6
2
1
3V3 OUT→
3V3 OUT→
2-WAY SCREW CONN

SYSTEM
SELECTION
JUMPER

MAX-UP
3v3   VIN

J8
CONN-H3

T2   T1
CONN-SIL1   CONN-SIL1

test2   test1

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TITLE:
E-Blocks Bluetooth Board
EB-024-00-2

DATE:
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BY: Conor Carr   REV: 1

J5
1 pcm_clk
6 gpio1
2 pcm_in
7
3 pcm_sync
8
4 pcm_out
9
5
D9 SOCKET
A

U1
1   ANA0   GPIO1   2   gpio1
3   ANA1   GPIO2   4
5   SPI-MISO UART-RI 6   ri
7   SPI-CBS   UART-DCD 8   dcd
9   SPI-CLK   UART-DSR 10   dsr
11 GND   UART-DTR 12   dtr
13 RESET   GPIO4   14
15 GND   GPIO5   16
17 SPI-MOSI GND   18
19 UART-CTS PCM-CLK 20   pcm_clk
21 UART-TX   PCM-IN   22   pcm_in
23 UART-RTS PCM-SYNC 24   pcm_sync
25 UART-RX   PCM-OUT 26   pcm_out
27 test1 3V3 N/C6   28
29 VIN   GND   30
31 N/C1   RESERVE1 32
33 N/C2   RESERVE2 34
35 N/C3   GND   36
37 N/C4   GND   38
39 test2 1V8 N/C7   40
    TAB1   TAB2
BLU2I CONNECTOR

spi-miso
spi-cbs
spi-clk

spi-mosi
cts
tx
rts
rx

VIN

cts
dsr

R10   R11
47k   47k

J7
spi-miso 4
spi-cbs   3
spi-clk   2
spi-mosi 1
CONN-S4

R1 to R6 changed from 220R to 200R
on preludes request

3V3   MAX-UP

decoupling cap
for MAX3002
C3
100n 16V

R9
4k7

U2
10 EN   VL VCC 19
ri   1 IO_VL1 IO_Vcc1 20
dcd   3 IO_VL2 IO_Vcc2 18
dtr   4 IO_VL3 IO_Vcc3 17
dsr   5 IO_VL4 IO_Vcc4 16
rts   6 IO_VL5 IO_Vcc5 15
cts   7 IO_VL6 IO_Vcc6 14
rx   8 IO_VL7 IO_Vcc7 13
tx   9 IO_VL8 IO_Vcc8 12
         GND 11
MAX3002

J9
ri-max   RI-UP
dcd-max   DCD-UP
CONN-HB4

J10
dtr-max   DTR-UP
dsr-max   DSR-UP
CONN-HB4

J11
rts-max   RTS-UP
cts-max   CTS-UP
CONN-HB4

J12
rx-max   RX-UP
tx-max   TX-UP
CONN-HB4

J13
ri-max   ri-patch
dcd-max   dcd-patch
CONN-HB4

J14
dtr-max   dtr-patch
dsr-max   dsr-patch
CONN-HB4

J15
rts-max   rts-patch
cts-max   cts-patch
CONN-HB4

J16
rx-max   rx-patch
tx-max   tx-patch
CONN-HB4

P2 CONN-H8

R1 200R
R6 200R
R2 200R
R7 200R
R3 200R
R4 200R
R5 200R
R8 200R

J3
D9 PLUG
1
6
2
7
3
8
4
9
5
A

P1
1
2
3
4
5
6
7
8
CONN-H8

Patch System:
Allows UART signals
to be connected to
any of 8 connections
of the 9 way D-type
connector.

L1 LABEL
B1 BAG
F1 FEET
F2 FEET
F3 FEET
F4 FEET
F5 FEET
F6 FEET