

## MSP-RFLINK development board

## Users Manual



All boards produced by Olimex are ROHS compliant

Revision Initial, May 2011

Copyright(c) 2011, OLIMEX Ltd, All rights reserved

## **INTRODUCTION:**

MSP-RFLINK is wireless 2.4 GHz module. It is realized with MSP430F1232 ultra-low-power microcontroller.

## **BOARD FEATURES:**

- MSP430F1232 microcontroller
- nRF24L01 Nordic 2.4Ghz low power transceiver
- status LEDs
- user button
- JTAG connector
- pin holes for all microcontroller pins
- Dimensions: 73.71 x 19.56 mm (2.90 x 0.77")

## **ELECTROSTATIC WARNING:**

The **MSP-RFLINK** board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

## **BOARD USE REQUIREMENTS:**

**Cables:** The cable you will need depends on the programmer/debugger you use. If you use MSP430-JTAG-TINY, MSP430-JTAG-TINY-V2 or MSP430-JTAG-ISO, you will need USB A-B cable. If you use MSP430-JTAG, you will need LPT cable.

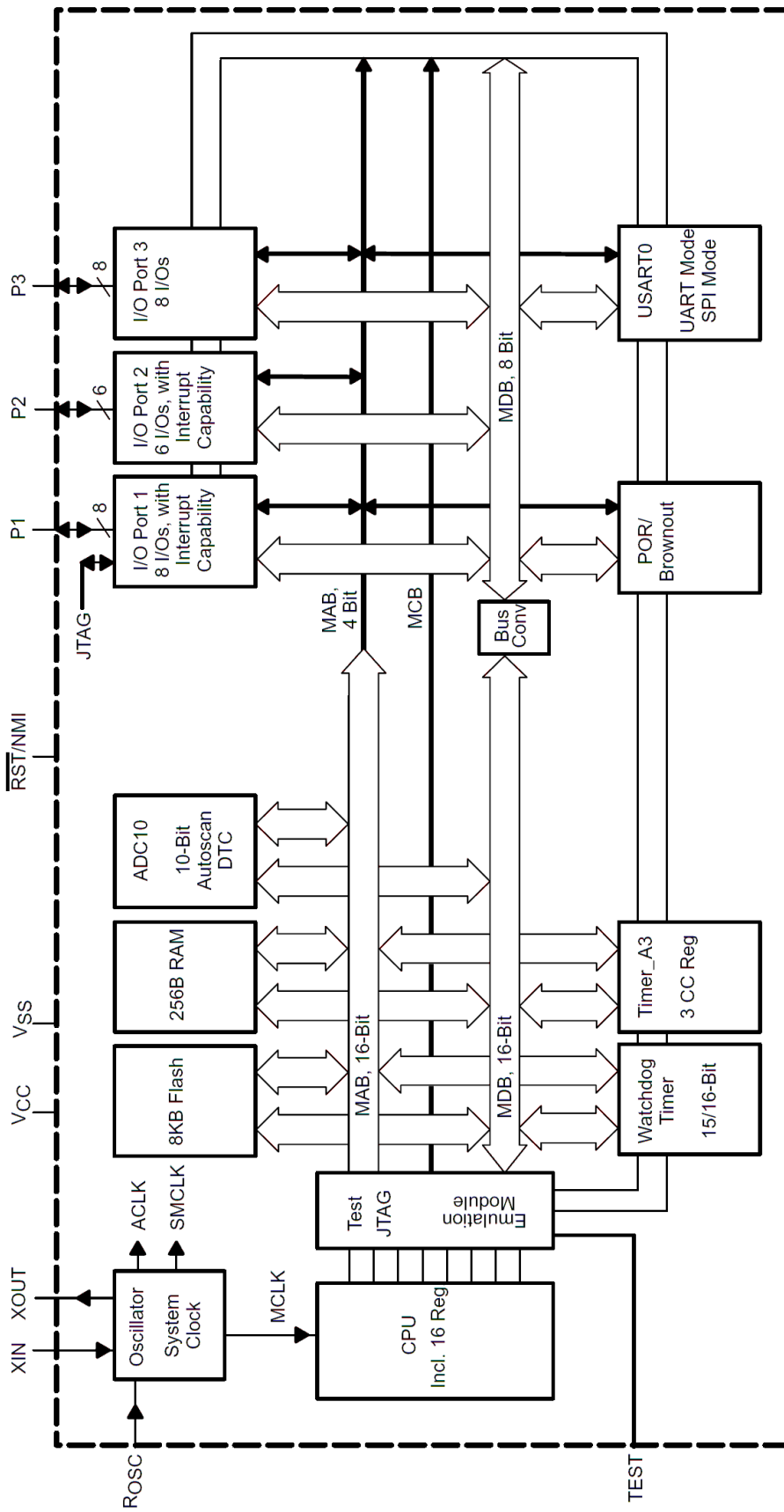
**Hardware:** Programmer/Debugger [MSP430-JTAG](#), [MSP430-JTAG-TINY](#), [MSP430-JTAG-TINY-V2](#), [MSP430-JTAG-ISO](#) by OLIMEX, or other compatible programming/debugging tool.

## **PROCESSOR FEATURES:**

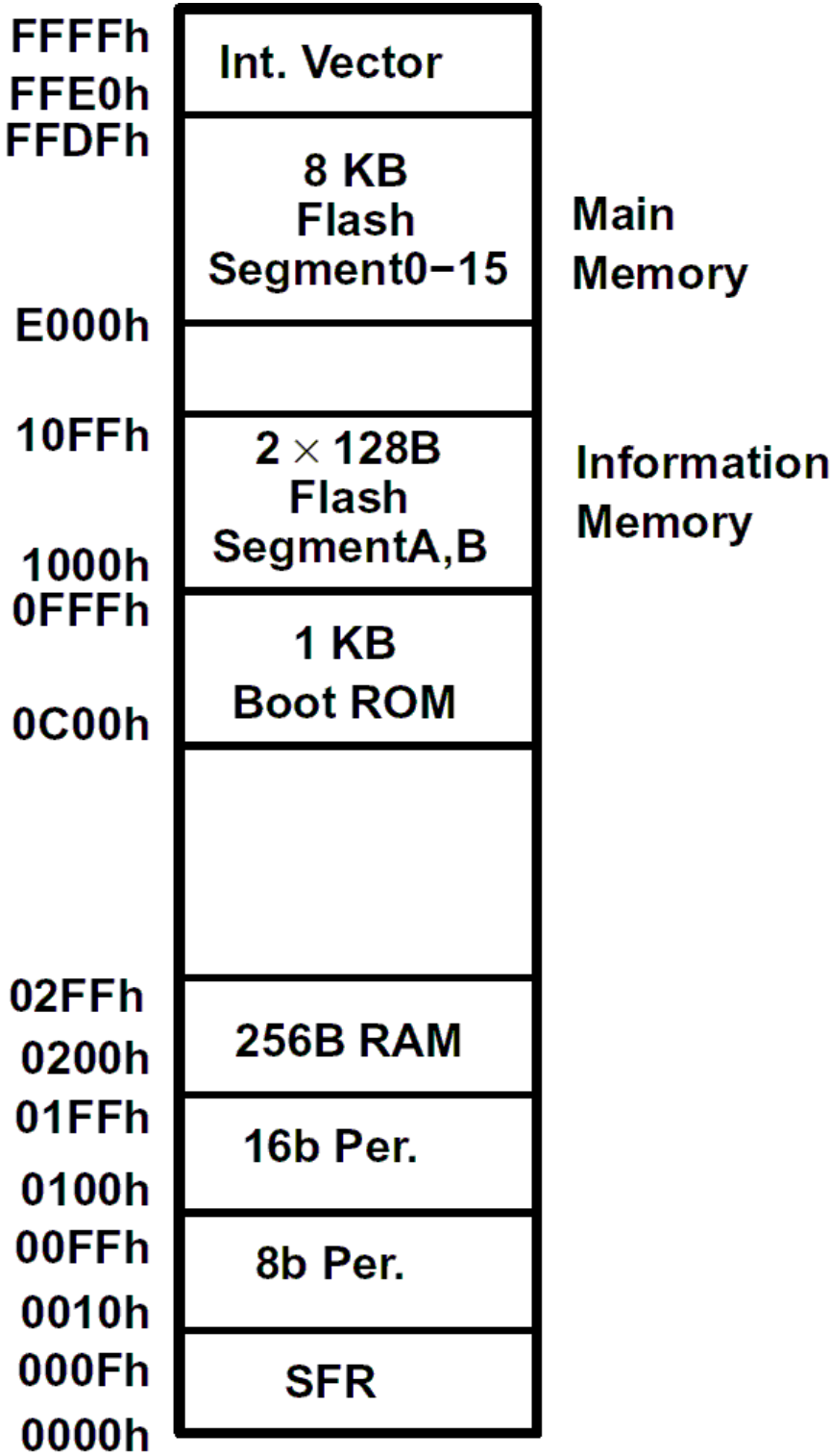
**MSP-RFLINK** board use **MSP430F1232** microcontroller from Texas Instruments with these features:

- 8KB + 256B Flash Memory
- 256B RAM
- Ultralow-Power Consumption:
  - Active Mode: 200  $\mu$ A at 1 MHz, 2.2 V
  - Standby Mode: 0.7  $\mu$ A
  - Off Mode (RAM Retention): 0.1  $\mu$ A
- Five Power Saving Modes
- Wake-Up From Standby Mode in less than 6  $\mu$ s
- 16-Bit RISC Architecture, 125 ns Instruction Cycle Time
- Basic Clock Module Configurations:
  - Various Internal Resistors
  - Single External Resistor
  - 32-kHz Crystal
  - High Frequency Crystal
  - Resonator
  - External Clock Source
- 16-Bit Timer\_A With Three Capture/Compare Registers
- 10-Bit, 200-ksps A/D Converter With Internal Reference, Sample-and-Hold, Autoscan, and Data Transfer Controller
- Serial Communication Interface (USART0) With Software-Selectable Asynchronous UART or Synchronous SPI
- Serial Onboard Programming, No External Programming Voltage Needed
- Programmable Code Protection by Security Fuse
- Supply Voltage Brownout Protection

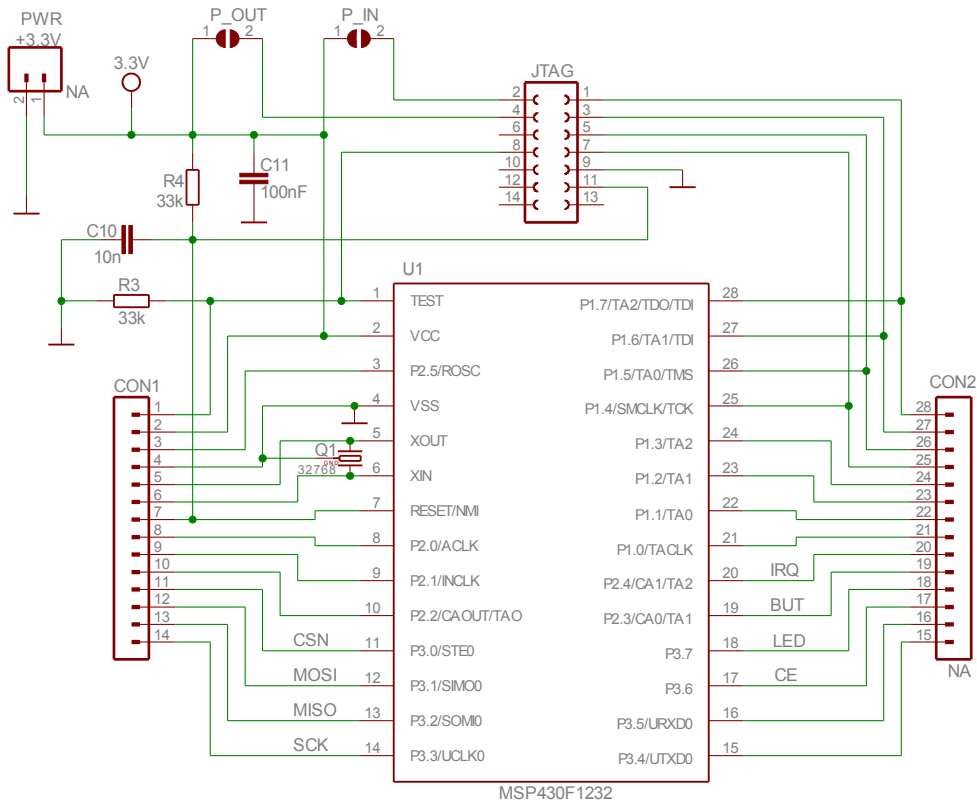
# BLOCK DIAGRAM:



**MEMORY ORGANIZATION:**



# SCHEMATIC:

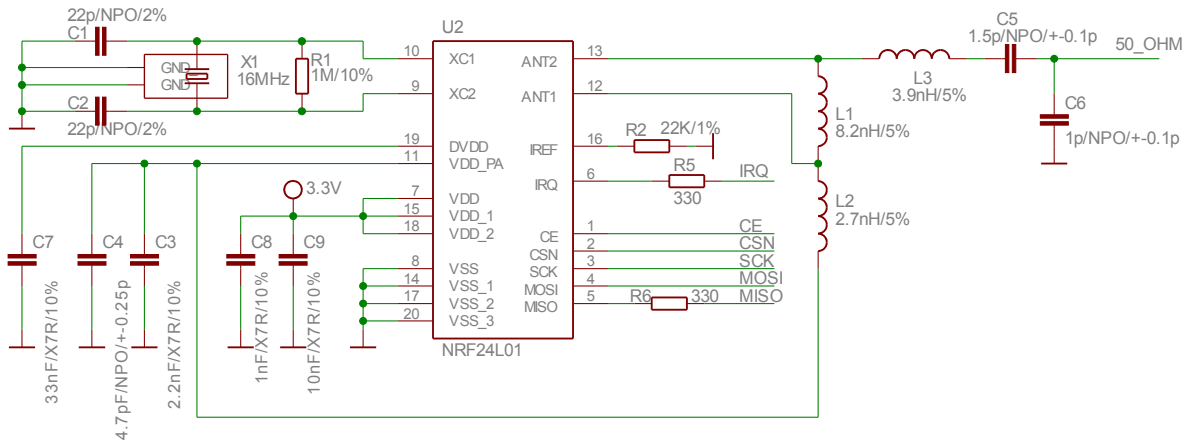
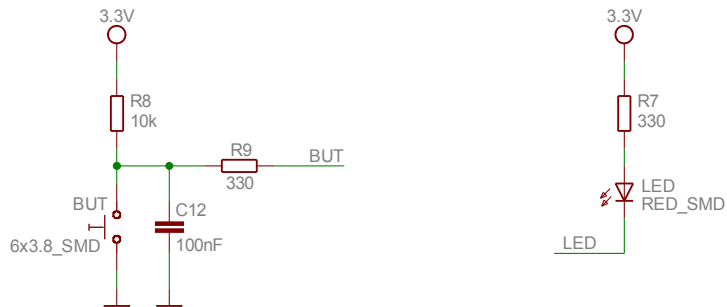


## MSP-RFLNK

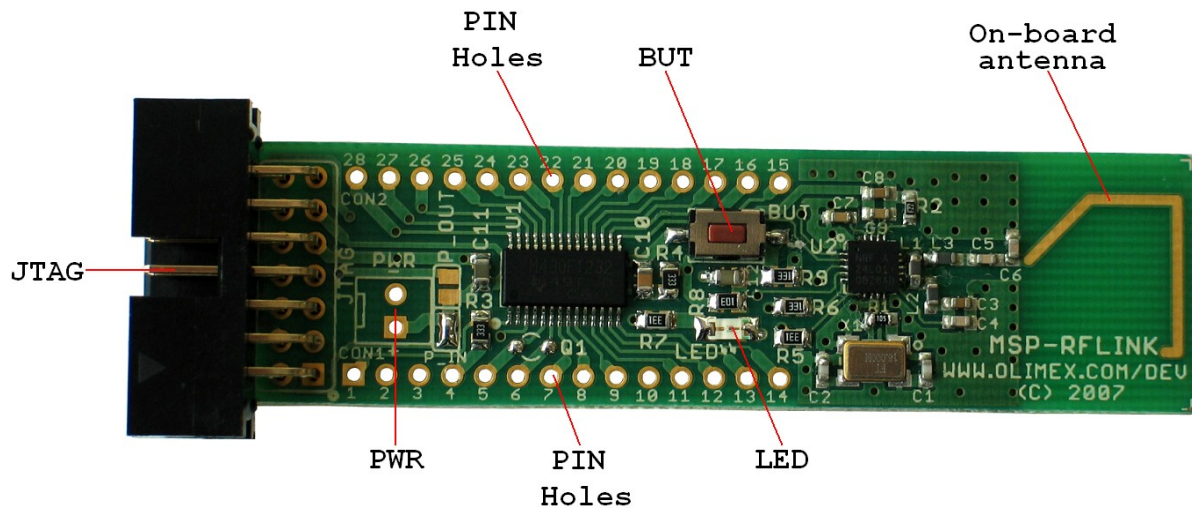
Rev. Initial

COPYRIGHT(C) 2007, OLIMEX Ltd.

<http://www.olimex.com/dev>



## BOARD LAYOUT:



## POWER SUPPLY CIRCUIT:

MSP-RFLINK is typically power supplied with 3.3VDC via PWR pin holes.

The programmed board power consumption is up to 20 mA with all peripherals enabled.

## RESET CIRCUIT:

MSP-RFLINK reset circuit includes MSP430F1232 pin 7 (RESET/NMI), JTAG connector pin 11, C10 (10nF), R4 (33kΩ).

## CLOCK CIRCUIT:

Quartz crystal **Q1** 32.768 kHz is connected to MSP430F1232 pin 5 (XOUT) and pin 6 (XIN).

Quartz crystal **X1** 16MHz is connected to NRF24L01 pin 9 (XC2) and pin 10 (XC1).

## JUMPER DESCRIPTION:

P\_IN



When this jumper is closed, the board is power supplied by the standard JTAG pin 2. This is only possible when the consumption of the board is not very high which is typically the case with MSP430 microcontrollers. If this jumper is open the board should be power supplied by another external source. This jumper and P\_OUT should always be reversely open/closed, i.e. if P\_IN is closed, P\_OUT should be open and vice versa.

Default state is closed.

P\_OUT



When this jumper is closed, the board is power supplied not by the JTAG but from external source. Then the JTAG has to synchronize with the working voltages which is done through this line. This is especially important when debugging with JTAG. This jumper and P\_IN should always be reversely open/closed, i.e. if P\_OUT is closed, P\_IN should be open and vice versa.

Default state is open.

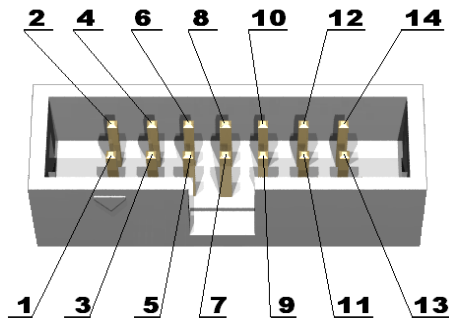
## INPUT/OUTPUT:

Status led (red) with name **LED**, connected to MSP430F1232 pin 18 (P3.7).

User button with name **BUT** connected to MSP430F1232 pin 19 (P2.3/CA0/TA1).

## EXTERNAL CONNECTORS DESCRIPTION:

### JTAG:



| Pin # | Signal Name | Pin # | Signal Name       |
|-------|-------------|-------|-------------------|
| 1     | P1.7        | 2     | Via P_IN to 3.3V  |
| 3     | P1.6        | 4     | Via P_OUT to 3.3V |
| 5     | P1.5        | 6     | NC                |
| 7     | P1.4        | 8     | TEST              |
| 9     | GND         | 10    | NC                |
| 11    | RESET       | 12    | NC                |
| 13    | NC          | 14    | NC                |

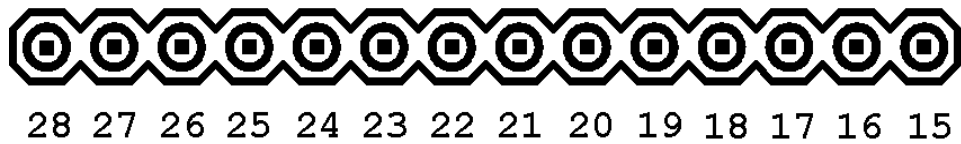


CON1:



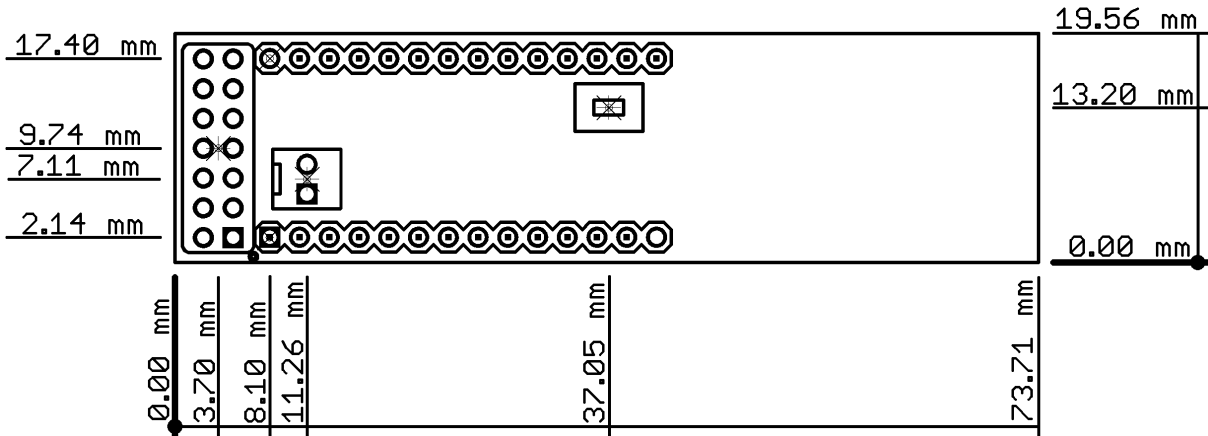
| Pin # | Signal Name | Pin# | Signal Name |
|-------|-------------|------|-------------|
| 1     | TEST        | 2    | VCC         |
| 3     | P2.5        | 4    | GND         |
| 5     | XOUT        | 6    | XIN         |
| 7     | RESET       | 8    | P2.0        |
| 9     | P2.1        | 10   | P2.2        |
| 11    | CSN         | 12   | MOSI        |
| 13    | MISO        | 14   | SCK         |

CON2:



| Pin # | Signal Name | Pin# | Signal Name |
|-------|-------------|------|-------------|
| 15    | P3.4        | 16   | P3.5        |
| 17    | CE          | 18   | LED         |
| 19    | BUT         | 20   | IRQ         |
| 21    | P1.0        | 22   | P1.1        |
| 23    | P1.2        | 24   | P1.3        |
| 25    | P1.4        | 26   | P1.5        |
| 27    | P1.6        | 28   | P1.7        |

**MECHANICAL DIMENSIONS:**



## **AVAILABLE DEMO SOFTWARE:**

- MSP430-RFLINK [test software](#)

## **ORDER CODE:**

MSP-RFLINK - assembled and tested board

### **How to order?**

You can order to us directly or by any of our distributors.  
Check our web [www.olimex.com/dev](http://www.olimex.com/dev) for more info.

## **Revision history:**

|                   |                             |
|-------------------|-----------------------------|
| Board's revision  | Rev. Initial, November 2007 |
| Manual's revision | Rev. Initial, May 2011      |

**Disclaimer:**

© 2011 Olimex Ltd. All rights reserved. Olimex®, logo and combinations thereof, are registered trademarks of Olimex Ltd. Other terms and product names may be trademarks of others.

The information in this document is provided in connection with Olimex products. No license, express or implied or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Olimex products.

Neither the whole nor any part of the information contained in or the product described in this document may be adapted or reproduced in any material from except with the prior written permission of the copyright holder.

The product described in this document is subject to continuous development and improvements. All particulars of the product and its use contained in this document are given by OLIMEX in good faith. However all warranties implied or expressed including but not limited to implied warranties of merchantability or fitness for purpose are excluded.

This document is intended only to assist the reader in the use of the product. OLIMEX Ltd. shall not be liable for any loss or damage arising from the use of any information in this document or any error or omission in such information or any incorrect use of the product.