



## MSP430-PIR development board

## Users Manual



All boards produced by Olimex are ROHS compliant

Revision C, April 2011

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## **INTRODUCTION:**

MSP430-PIR is pir sensor with MSP430F2013 microcontroller.

## **BOARD FEATURES:**

- MSP430F2013 microcontroller
- low power PIR sensor
- status LEDs
- CR2032 battery holder
- JTAG connector
- supports both Olimex and TI SBW layout
- Dimensions: 42.27x25.89 mm (1.66x1.03")

## **ELECTROSTATIC WARNING:**

The **MSP430-PIR** 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-V2, you will need USB A-B cable, and if you use MSP430-JTAG, you will need LPT cable.

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

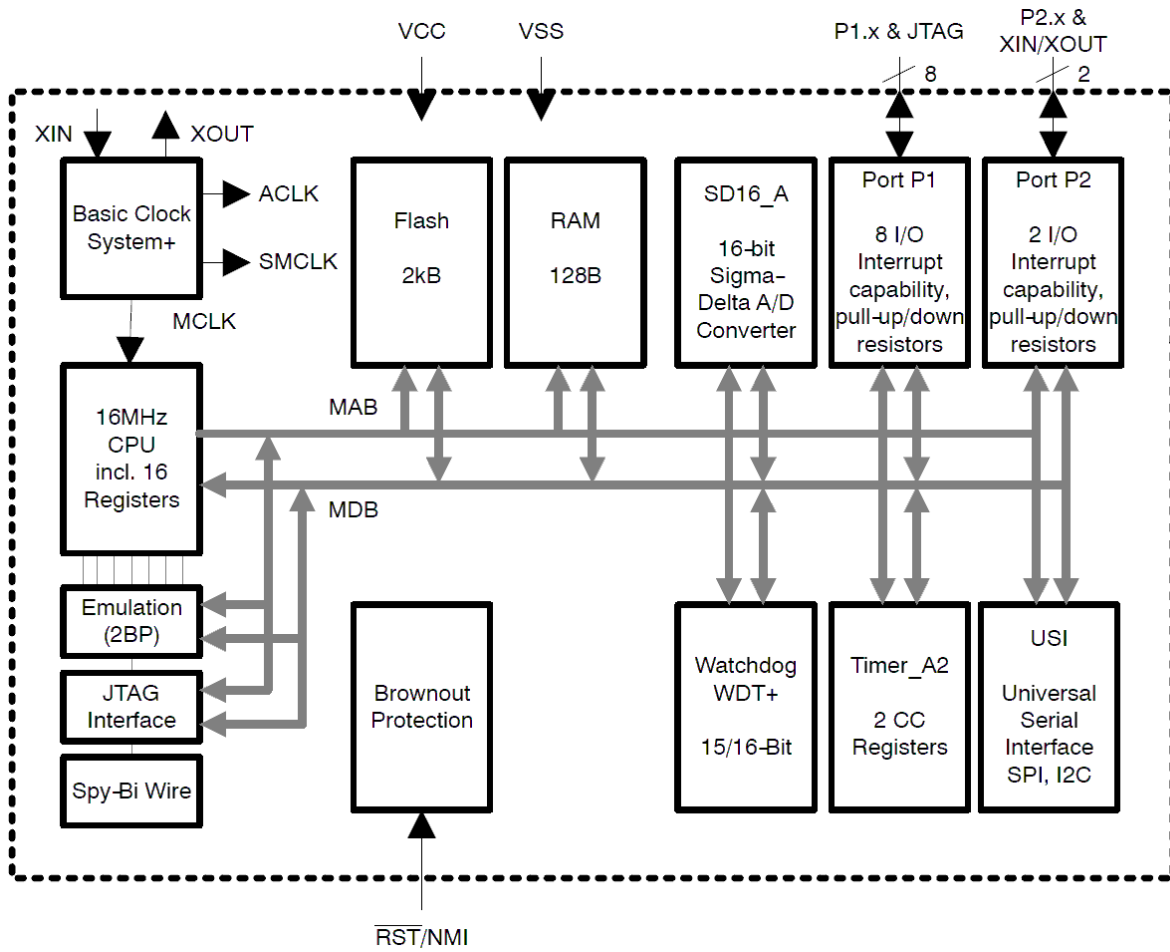
## **PROCESSOR FEATURES:**

**MSP430-PIR** board use ultralow-power microcontroller **MSP430F2013** from Texas Instruments with these features:

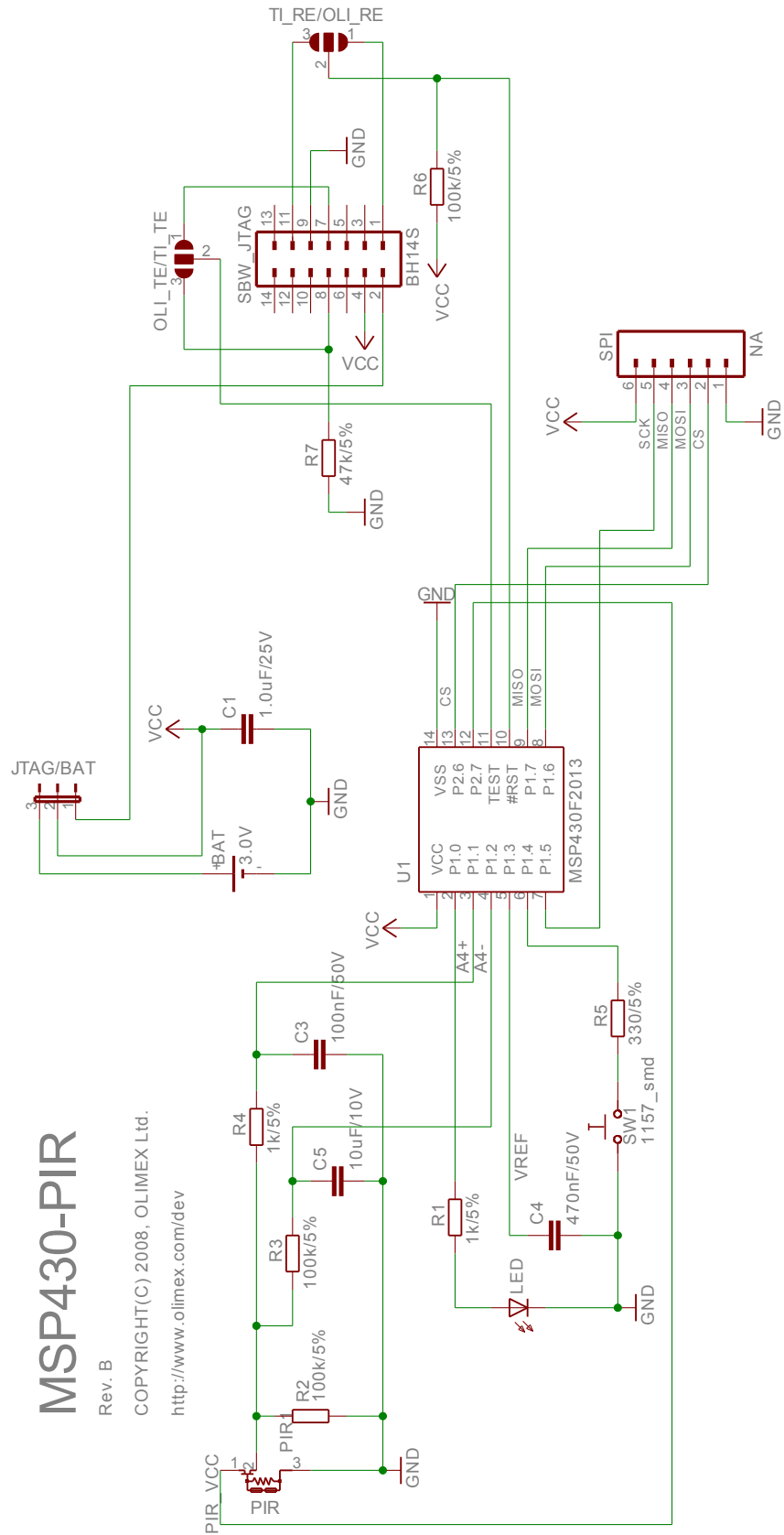
- Low Supply Voltage Range 1.8 V to 3.6 V
- Ultralow-Power Consumption
  - Active Mode: 220  $\mu$ A at 1 MHz, 2.2 V
  - Standby Mode: 0.5  $\mu$ A
  - Off Mode (RAM Retention): 0.1  $\mu$ A
- Five Power-Saving Modes
- Ultrafast Wake-Up From Standby Mode in Less Than 1  $\mu$ s

- 16-Bit RISC Architecture, 62.5 ns Instruction Cycle Time
- Basic Clock Module Configurations:
  - Internal Frequencies up to 16 MHz With Four Calibrated Frequencies to  $\pm 1\%$
  - Internal Very Low Power LF Oscillator
  - 32-kHz Crystal
  - External Digital Clock Source
- 16-Bit Timer\_A With Two Capture/Compare Registers
- 16-Bit Sigma-Delta A/D Converter With Differential PGA Inputs and Internal Reference
- Universal Serial Interface (USI) Supporting SPI and I2C
- Brownout Detector
- Serial Onboard Programming, No External Programming Voltage Needed
- Programmable Code Protection by Security Fuse
- On-Chip Emulation Logic With Spy-Bi-Wire Interface
- 2KB + 256B Flash Memory
- 128B RAM

**BLOCK DIAGRAM:**



**SCHEMATIC:**



## POWER SUPPLY CIRCUIT:

**MSP430-PIR** can take power from two sources:

- + 3V Lithium battery
- JTAG connector

Power consumption in standby mode is 10µA. In working mode the maximum power consumption is 1.3mA.

## RESET CIRCUIT:

**MSP430-PIR** reset circuit includes jumper TI\_RE/OLI\_RE, pull-up resistor R16 (100k) and MSP430F2013 pin 10 (#RST – signal SBWDAT).

## JUMPER DESCRIPTION:

### TI\_RE/OLI\_RE



This jumper, when is in position TI\_RE, connects SBW\_JTAG pin 1 to MSP430F2013 pin 10 (#RST – signal SBWDAT). When this jumper is in position OLI\_RE, connects SBW\_JTAG pin 11 to MSP430F2013 pin 10 (#RST – signal SBWDAT).

Default state is in position OLI\_RE for programming with OLIMEX MSP430-JTAG.

### OLI\_TE/TI\_TE



This jumper, when is in position OLI\_TE, connects SBW\_JTAG pin 8 to MSP430F2013 pin 11 (TEST). When this jumper is in position TI\_TE, connects SBW\_JTAG pin 7 to MSP430F2013 pin 11 (TEST).

Default state is in position OLI\_TE for programming with OLIMEX MSP430-JTAG.

**Olimex** Jumpers TI\_RE/OLI\_RE and OLI\_TE/TI\_TE are for selecting programmers - JTAGS, or Texas Instruments - JTAGS.

### JTAG/BAT



This jumper, when is in position JTAG – the board power supply is from the JTAG and when is in position BAT – the board power supply is from + 3 V Battery.

Default state is in position JTAG.

## INPUT/OUTPUT:

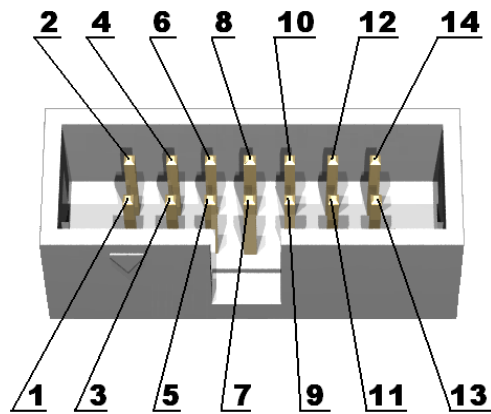
**LED (red)** connected to MSP430F2013 pin 2 (P1.0).

**User button** with name **SW1** connected via R5 (330 Ω) to **MSP430F2013** pin 6 (P1.4) – enables and disables blinking LED.

## EXTERNAL CONNECTORS DESCRIPTION:

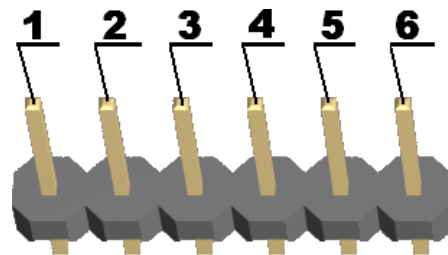
### SBW JTAG:

Pin #	Signal Name
1	To TI_RE/OLI_RE
2	To JTAG/BAT
3	Not connected
4	VCC
5	Not connected
6	Not connected
7	To OLI_TE/TI_TE
8	To OLI_TE/TI_TE
9	GND
10	Not connected
11	To TI_RE/OLI_RE
12	Not connected
13	Not connected
14	Not connected

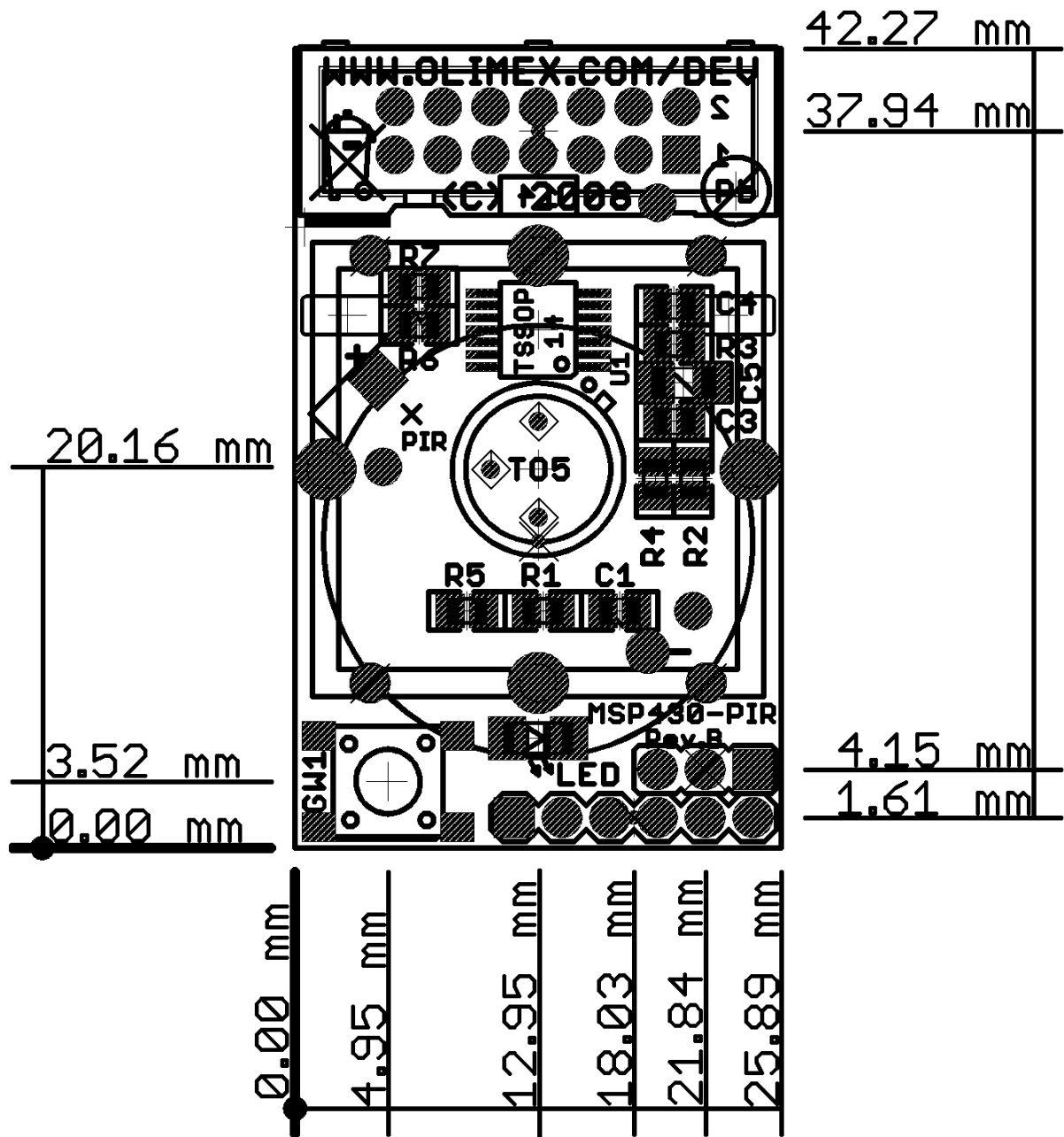


### SPI:

Pin #	Signal Name
1	GND
2	CS
3	MOSI
4	MISO
5	SCK
6	VCC



MECHANICAL DIMENSIONS:





## **AVAILABLE DEMO SOFTWARE:**

For demo software visit <http://www.olimex.com/dev>

## **ORDER CODE:**

**MSP430-PIR** - 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: B, June 2008  
Manual's Revision: C, April 2011

- added power consumption

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