

## MSP430-PG2231 development board

### Users Manual



All boards produced by Olimex are ROHS compliant

Revision A, June 2011

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## **INTRODUCTION:**

MSP430-PG2231 is prototype board with MSP430G2231IPW14R ultralow-power mixed signal microcontroller from Texas Instruments. MSP430G2231IPW14R has a built-in 16-bit timer, ten I/O pins, a 10-bit A/D converter and built-in communication capability using synchronous protocols (SPI or I2C). On the board are available JTAG connector, two status leds, two user buttons and prototype area, where you can connect your own circuits. All this allows you to build a diversity of applications to be used in different applications.

## **BOARD FEATURES:**

- Microcontroller MSP430G2231IPW14R
- JTAG interface
- Two user's buttons
- Two status leds
- Power-on led
- Reset button
- Prototype area
- FR-4, 1.5 mm, soldermask, component print
- Dimensions:70x50mm (2.76 x 1.97")

## **ELECTROSTATIC WARNING:**

The **MSP430-PG2231** 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:**

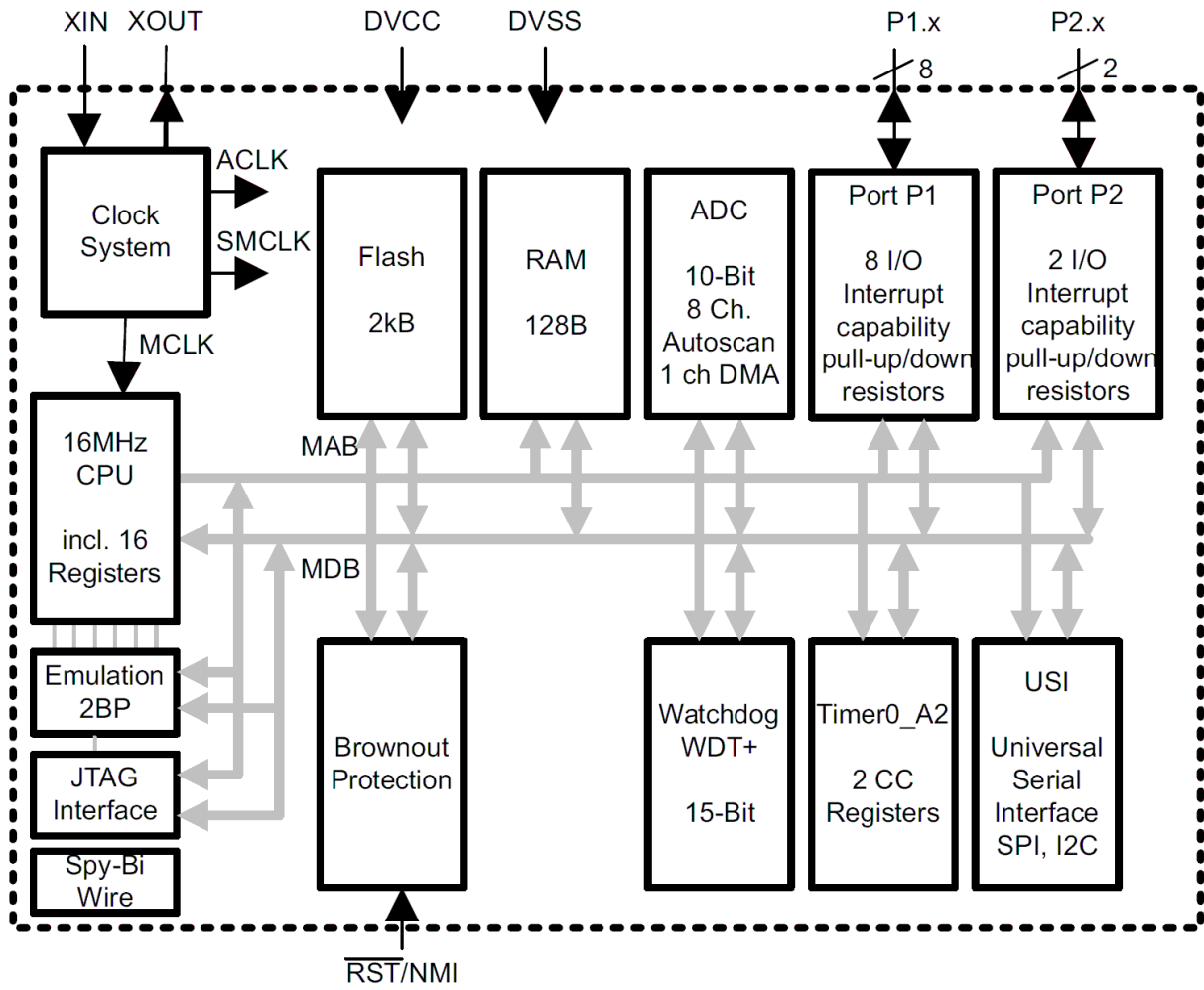
**MSP430-PG2231** board use **MSP430G2231IPW14R** microcontroller from Texas Instruments with these features:

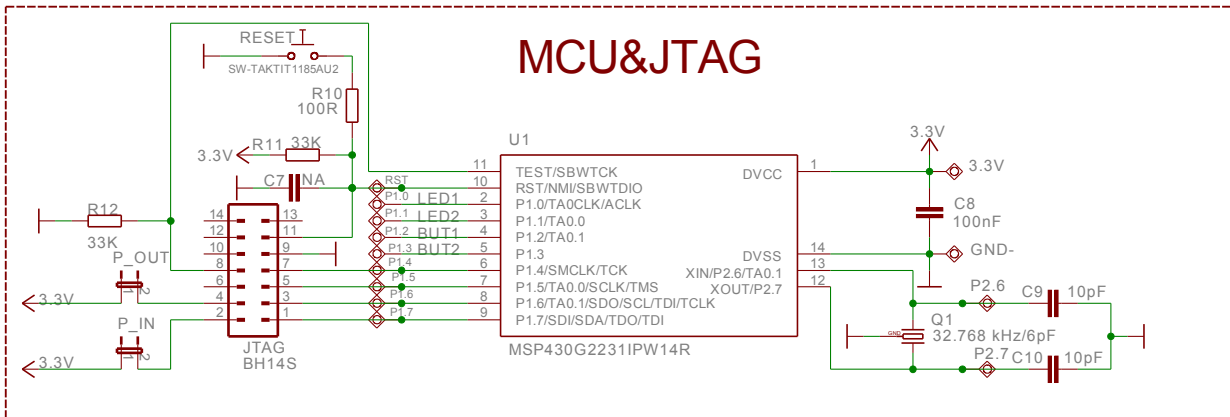
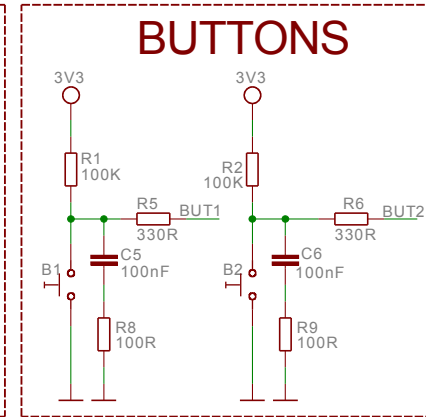
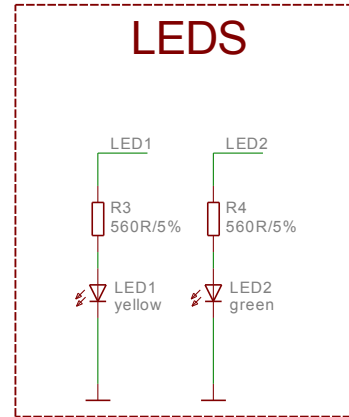
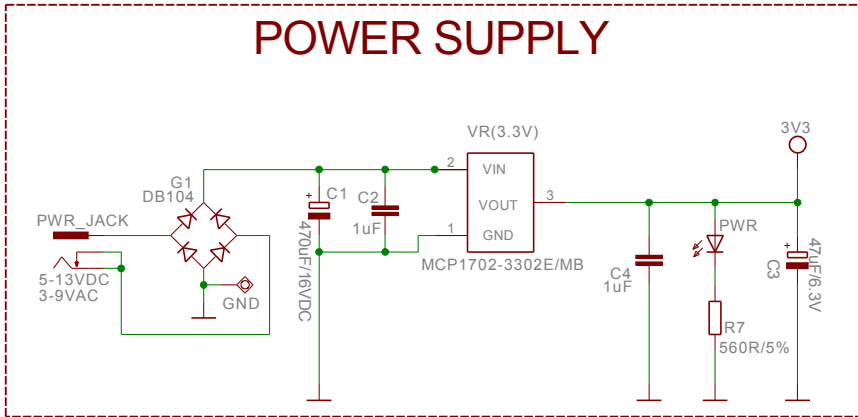
- Low Supply-Voltage Range: 1.8 V to 3.6 V
- Ultra-Low Power Consumption
  - Active Mode: 220  $\mu$ A at 1 MHz, 2.2 V
  - Standby Mode: 0.5  $\mu$ A
  - Off Mode (RAM Retention): 0.1  $\mu$ A
- Five Power-Saving Modes
- Ultra-Fast Wake-Up From Standby Mode in Less Than 1  $\mu$ s
- 16-Bit RISC Architecture, 62.5-ns Instruction Cycle Time
- Basic Clock Module Configurations
  - Internal Frequencies up to 16 MHz With One Calibrated Frequency
  - Internal Very Low Power Low-Frequency (LF) Oscillator
  - 32-kHz Crystal
  - External Digital Clock Source
- 16-Bit Timer\_A With Two Capture/Compare Registers
- Universal Serial Interface (USI) Supporting SPI and I2C
- Brownout Detector
- 10-Bit 200-ksps A/D Converter With Internal Reference, Sample-and-Hold, and Autoscan

- Serial Onboard Programming, No External Programming Voltage Needed, Programmable Code Protection by Security Fuse
- On-Chip Emulation Logic With Spy-Bi-Wire Interface

For more information about this microcontroller, see [here](#).

**BLOCK DIAGRAM:**





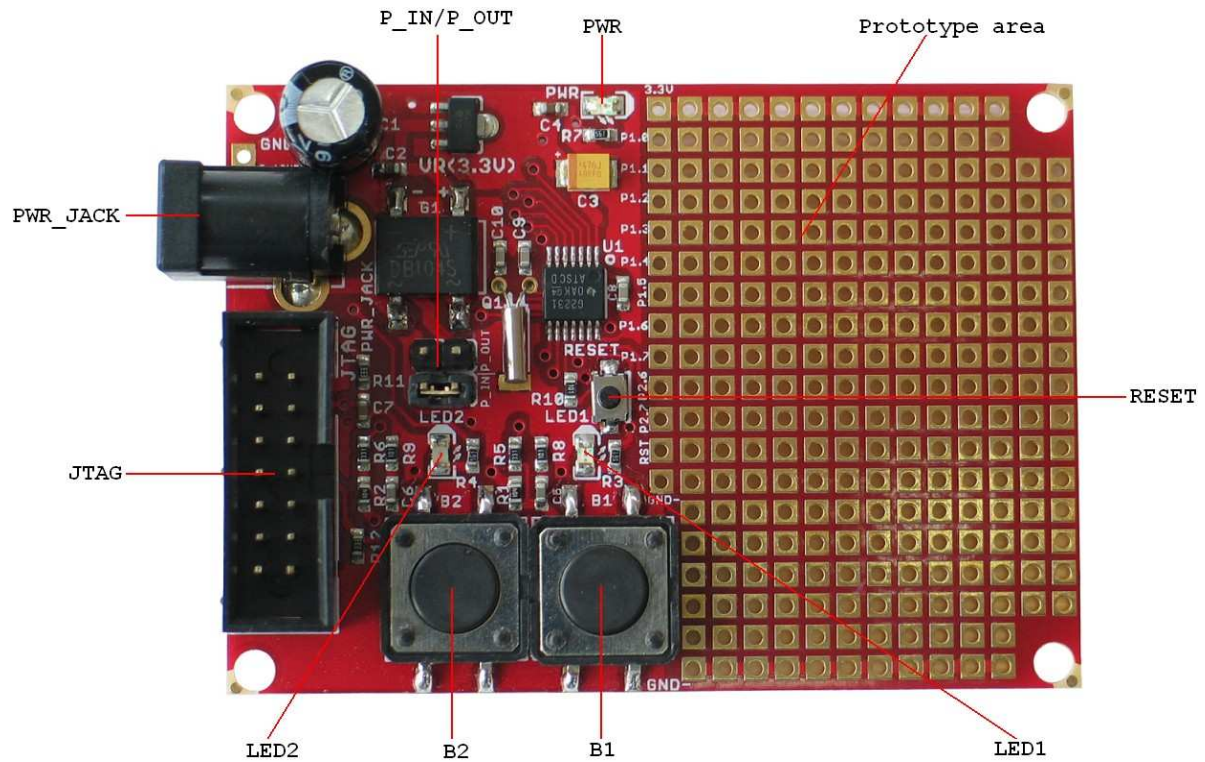
## MSP430-PG2231

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

## BOARD LAYOUT:



## POWER SUPPLY CIRCUIT:

MSP430-PG2231 is typically power supplied with (3 ÷ 9) VAC and (5 ÷ 13) VDC.

The programmed board power consumption is about 10 mA with all peripherals enabled.

## RESET CIRCUIT:

MSP430-PG2231 reset circuit includes MSP430G2231IPW14R pin 10 (RST/NMI/SBWTDIO), JTAG connector pin 11, R11 (33k $\Omega$ ), R10 (100 $\Omega$ ) and RESET button.

## CLOCK CIRCUIT:

Quartz crystal 32.768 kHz is connected to MSP430G2231IPW14R pin 12 (XOUT/P2.7) and pin 13 (XIN/P2.6/TA0.1).

## JUMPER DESCRIPTION:



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.



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 (yellow)** with name **LED1**, connected to MSP430G2231IPW14R pin 2 (P1.0/TA0CLK/ACLK).

**Status led (green)** with name **LED2**, connected to MSP430G2231IPW14R pin 3 (P1.1/TA0.0).

**Power-on LED (red)** with name **PWR** – this LED shows that +3.3V is applied to the board.

**User button** with name **B1** connected to **MSP430G2231IPW14R** pin 4 (P1.2/TA0.1).

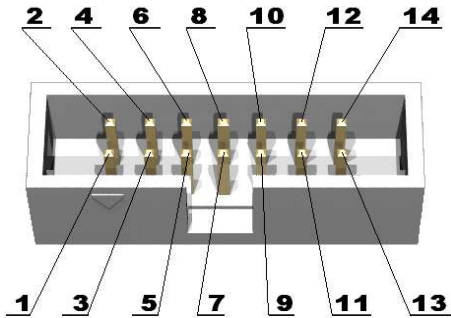
**User button** with name **B2** connected to **MSP430G2231IPW14R** pin 5 (P1.3).

**User button** with name **RESET** connected to **MSP430G2231IPW14R** pin 10 (RST/NMI/SBWTIO).



**EXTERNAL CONNECTORS DESCRIPTION:**

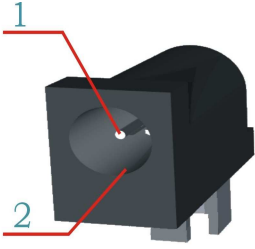
**JTAG:**



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	RST	12	NC
13	NC	14	NC

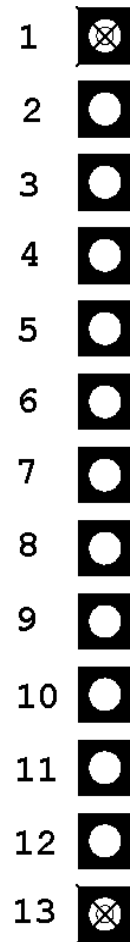
**PWR JACK:**

Pin #	Signal Name
1	Power Input
2	GND

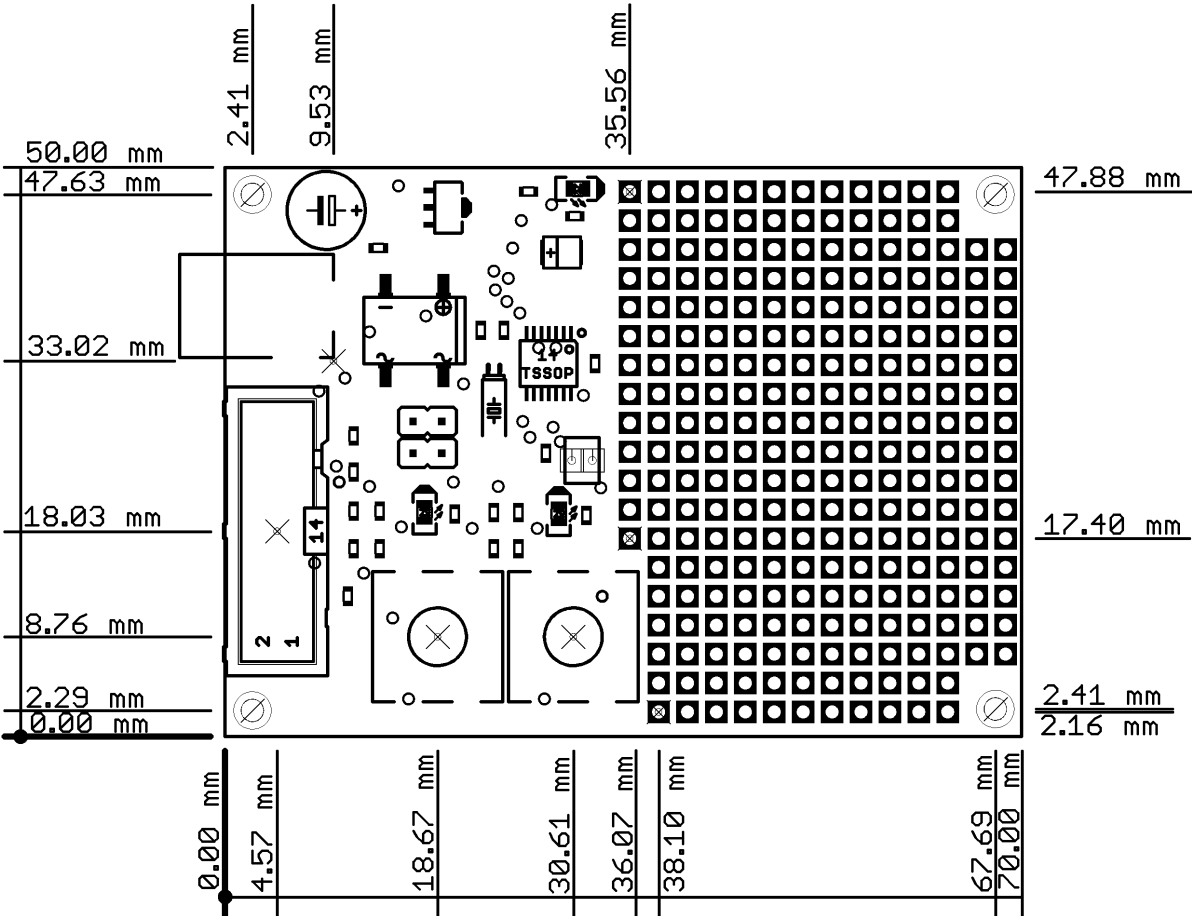


**Prototype area:**

Pin #	Signal Name
1	3.3V
2	P1.0 (LED1)
3	P1.1 (LED2)
4	P1.2 (BUT1)
5	P1.3 (BUT2)
6	P1.4
7	P1.5
8	P1.6
9	P1.7
10	P2.6
11	P2.7
12	RST
13	GND



**MECHANICAL DIMENSIONS:**



## **AVAILABLE DEMO SOFTWARE:**

- MSP430PG2231\_Example

## **ORDER CODE:**

**MSP430-PG2231** - 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. A, July 2010
Manual's revision	Rev. A, edited June 2011
	- in reset circuit C7 changed to NA (not available)

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