

## MSP430-1121STK2 development board

## Users Manual



All boards produced by Olimex are RoHS compliant

Rev. E, February 2006

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## INTRODUCTION

MSP430-1121STK2 starterkit development board provides easy way for developing and prototyping with MSP430F1121 microcontroller. It has JTAG interface, RS232 and most of the GPIOs are on extension headers where you can connect your additional circuits.

## BOARD FEATURES

MSP430-1121STK is development board with following features:

- MCU: **MSP430F1121A** with 4K Bytes Program Flash, 256 Bytes data Flash, 256 Bytes RAM
- JTAG connector
- RS232 connector
- RS232 interface circuit with Tx, Rx signals
- Dallas touch button port
- Frequency input
- two red LEDs
- two user buttons
- RESET button
- Buzzer
- connector for external 3V battery
- 3V li-ion battery holder (typeCR2032) on top
- 32 768 Hz oscillator crystal
- TEST pin pull-down
- RST/NMI pin pull-up
- power supply filtering capacitor
- extension headers for each uC pin
- PCB: FR-4, 1.5 mm (0,062"), green soldermask, white silkscreen component print
- Dimensions: 80x50 mm (3.15x1.96")

## ELECTROSTATIC WARNING

The **MSP430-1121STK2** 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, you will need LPT cable. You will need

1.8 meter USB A-B cable to connect MSP430-JTAG-ISO or MSP430-JTAG-TINY to a USB host on your PC. If you use MSP430-JTAG-RF, you will not need a cable.

**Hardware:** Programmer/Debugger – one of the Olimex MSP430-JTAG tools: **MSP430-JTAG, MSP430-JTAG-ISO, MSP430-JTAG-TINY, MSP430-JTAG-RF.**

**Software:** MSP430 KickStart software. KickStart allow you to write and debug code in assembly language without any limitations and to write code in C with 2K limit. The latest release of KickStart software may be free download from TI web site: <http://www.ti.com/sc/msp430root>.

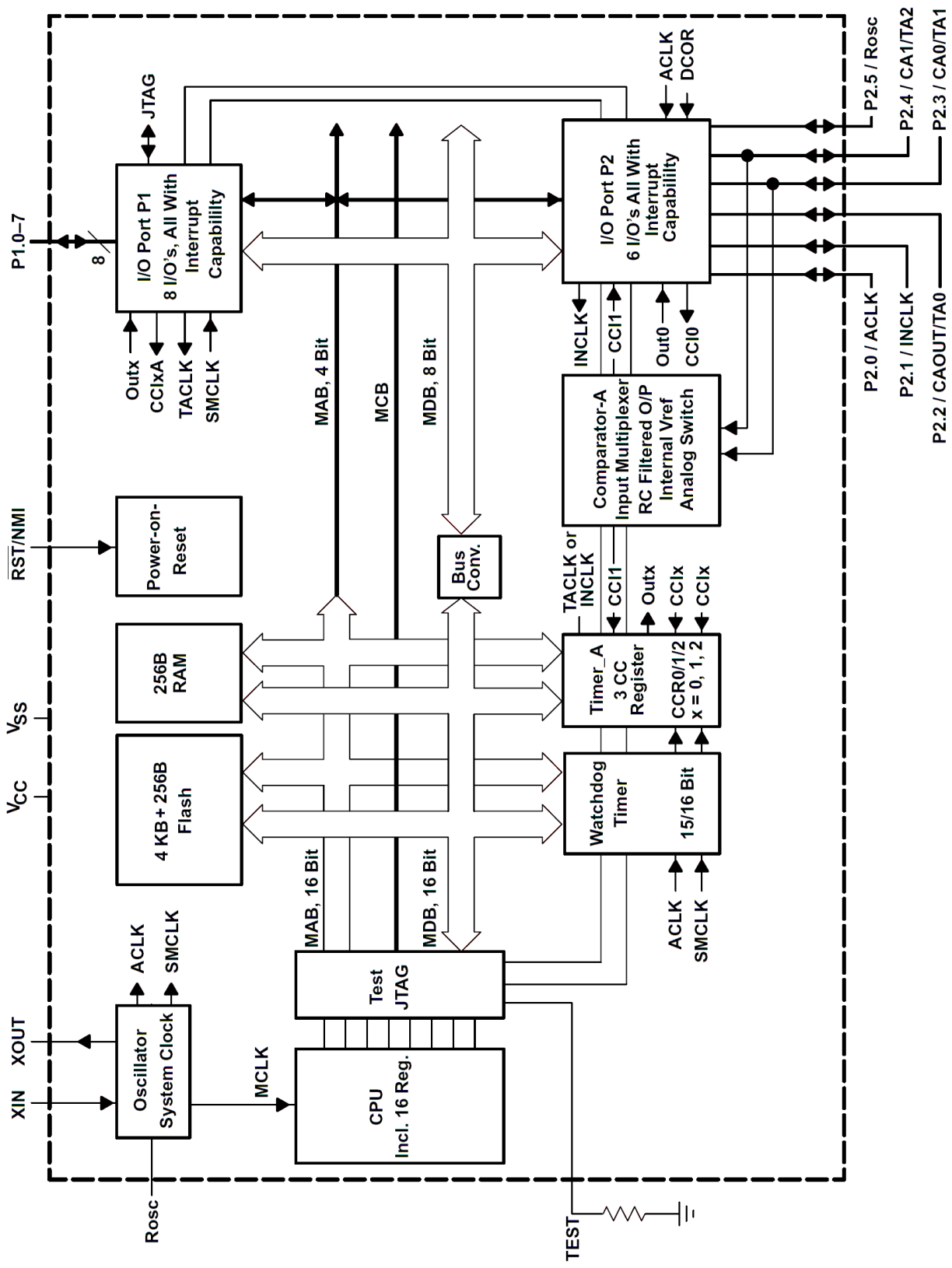
## **PROCESSOR FEATURES**

- Low Supply Voltage Range 1.8 V – 3.6 V
- Ultralow-Power Consumption  
Low Operation Current,  
1.3 mA at 4 kHz, 2.2 V  
160 mA at 1 MHz, 2.2 V
- Five Power Saving Modes:  
(Standby Mode: 0.8 mA,  
RAM Retention Off Mode: 0.1 mA)
- Wake-Up From Standby Mode in 6 ms
- 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 With Three Capture/Compare  
Registers
- Slope A/D Converter With External  
Components
- On-Chip Comparator for Analog Signal  
Compare Function or Slope A/D

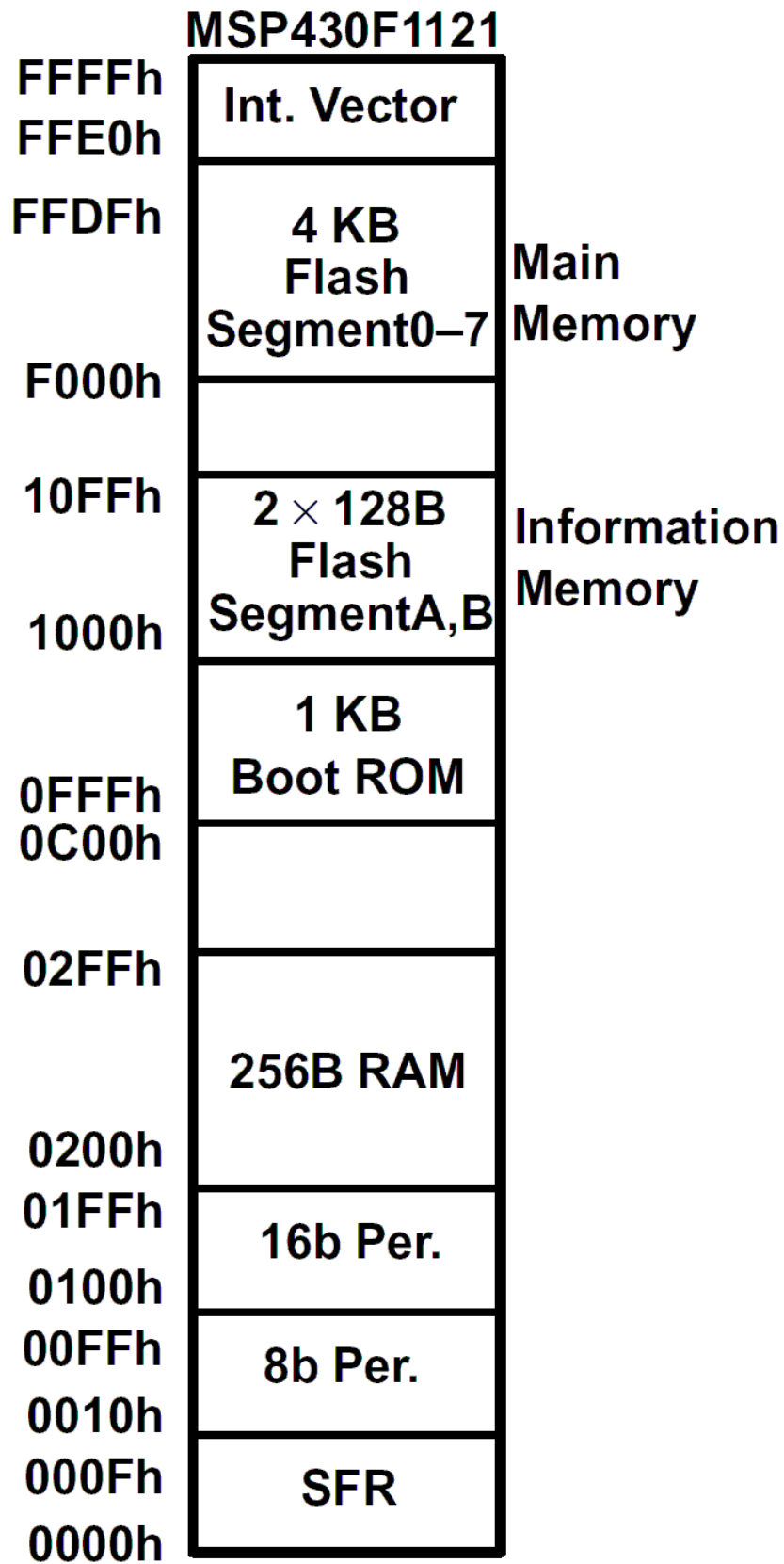
### Conversion

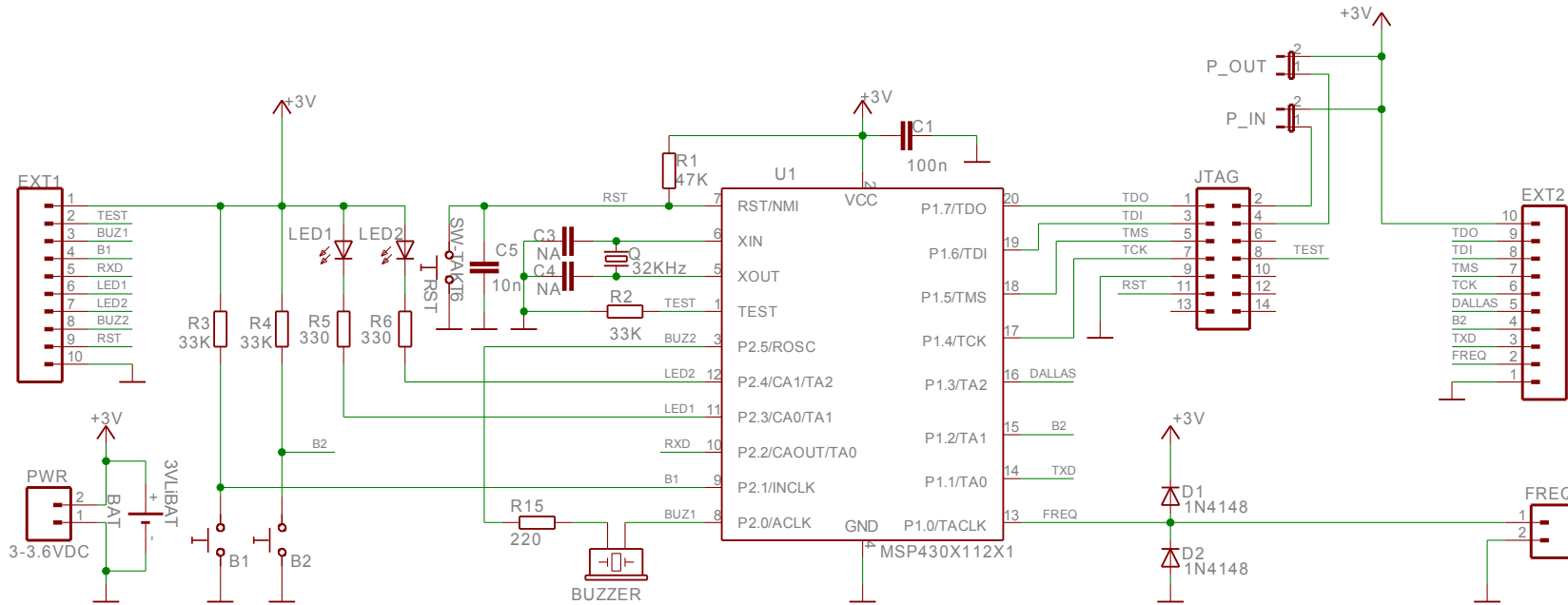
- Serial Onboard Programming
- 4KB + 256B Flash Memory  
(MTP), 256B RAM

# BLOCK DIAGRAM



# MEMORY MAP



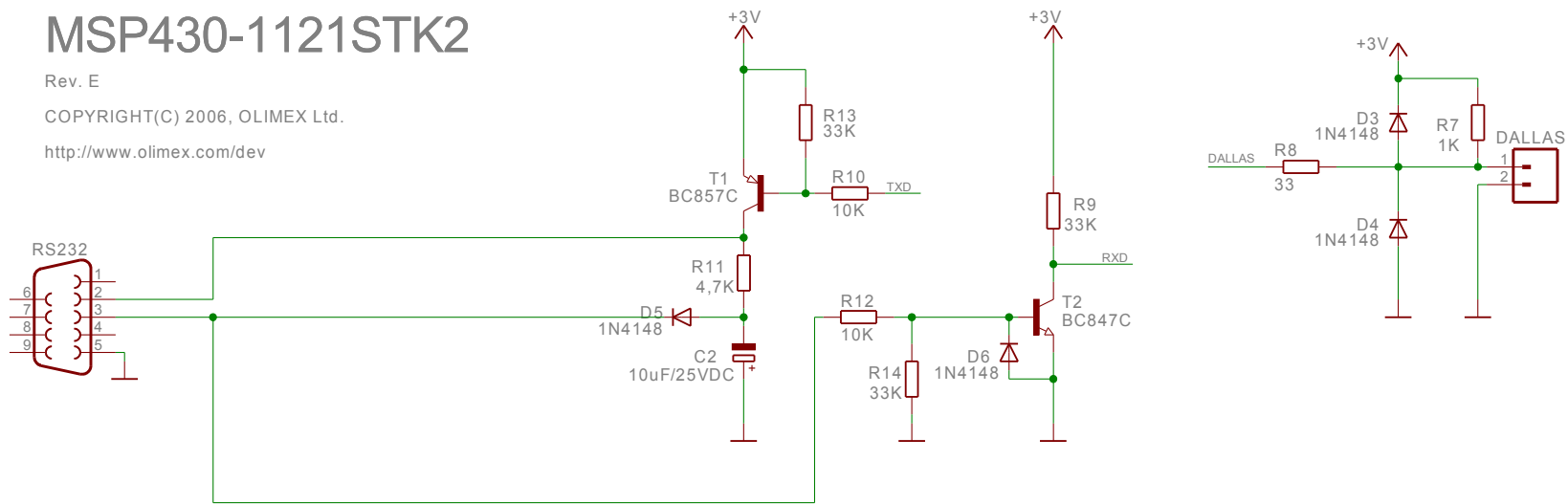


# MSP430-1121STK2

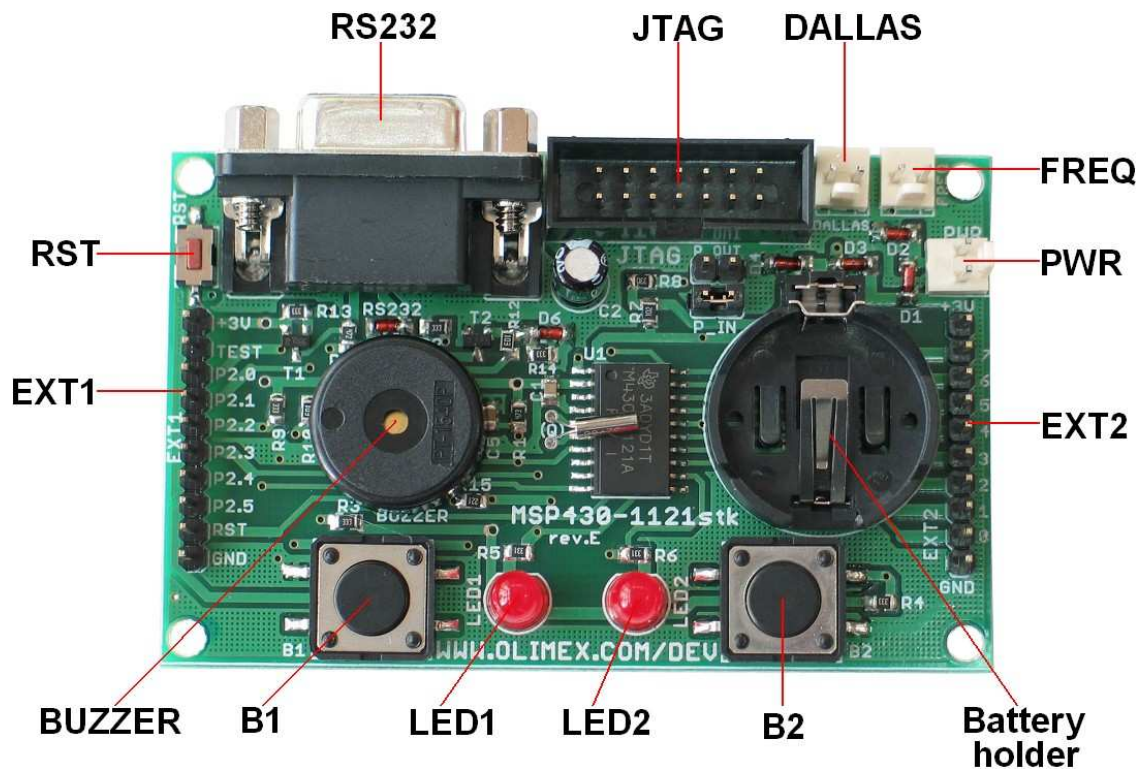
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<http://www.olimex.com/dev>



## BOARD LAYOUT



## POWER SUPPLY CIRCUIT

MSP430-1121STK2 is typically power supplied from the JTAG interface (P\_IN closed). If not (P\_OUT - closed), you could power supply the board if you apply up to 3.6 VDC at EXT1 pin 1 and GND (pin 10), or at EXT2 pin 10 and GND (pin 1). Also you could power supply the board via 3V lithium battery, or 2x1.5V AA batteries .

## RESET CIRCUIT

MSP430-1121STK2 reset circuit is realized with a pull-up resistor R1 (47k) and RST button. You could also reset the MCU with an active low level at the JTAG pin 11 or at EXT1 pin 9 (MSP430F1112 - pin 7).

## CLOCK CIRCUIT

Quartz crystal 32 768 Hz is connected to MSP430F1112 pin 6 (XIN) and pin 5 (XOUT).

## 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**

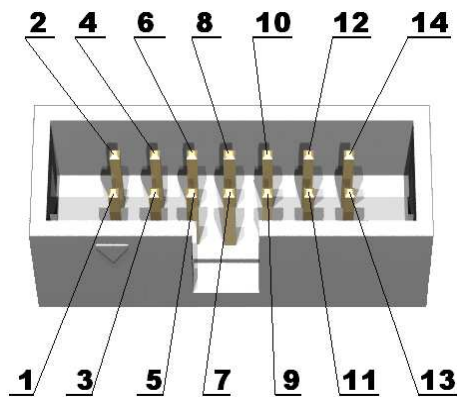


When this jumper is closed, the board is power supplied not by the JTAG but from external source. Then the JTAG has to synchronize with the working voltages which is done through this line. This is especially important when debugging with JTAG. This jumper and P\_IN should always be reversely open/closed,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

Default state is open.

## EXTERNAL CONNECTORS DESCRIPTION

### JTAG



Pin #	Signal Name	Pin#	Signal Name
1	TDO	2	P_IN
3	TDI	4	P_OUT
5	TMS	6	NC
7	TCK	8	TEST
9	GND	10	NC
11	RST	12	NC
13	NC	14	NC

**TDI** Input **Test Data In**. This is the serial data input for the shift register.

**TDO** Output **Test Data Out**. This is the serial data output for the shift register. Data is shifted out of the device on the negative edge of the TCK signal.

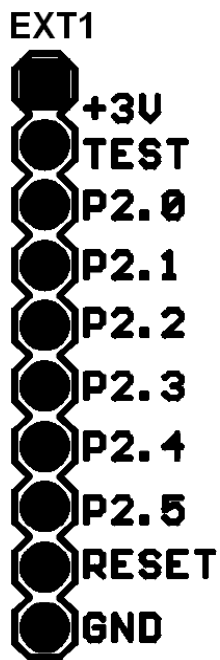
**TMS** Input **Test Mode Select**. The TMS pin selects the next state in the TAP state machine.

**TCK** Input **Test Clock**. This allows shifting of the data in, on the TMS and TDI pins. It is a positive edge triggered clock with the TMS and TCK signals that define the internal state of the device.

**P\_IN** Input **Power In**. Normally, if there isn't external power source, this signal power supplies the board.

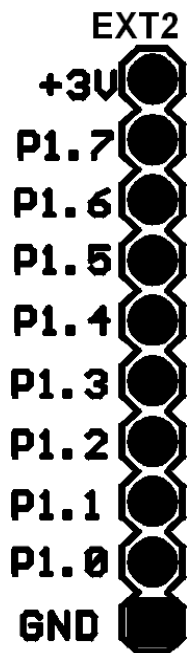
**P\_OUT** Output **Power Out**. When there is external power supply, this is the voltage synchronization signal for the JTAG interface.

## EXT1



Pin #	Signal Name
1	+3V
2	TEST
3	P2.0 = BUZ1
4	P2.1 = B1
5	P2.2 = RxD
6	P2.3 = LED1
7	P2.4 = LED2
8	P2.5 = BUZ2
9	RESET = RST
10	GND

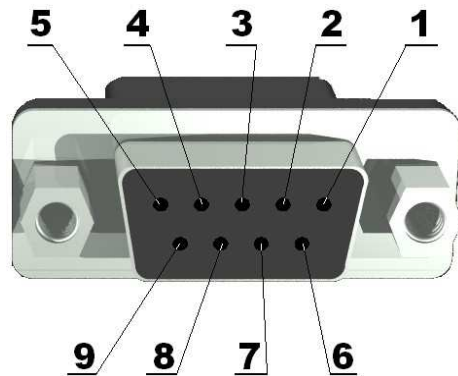
## EXT2



Pin #	Signal Name
1	GND
2	P1.0 = FREQ
3	P1.1 = TxD
4	P1.2 = B2
5	P1.3 = DALLAS
6	P1.4 = TCK
7	P1.5 = TMS
8	P1.6 = TDI
9	P1.7 = TDO
10	+3V

## RS232

Pin #	Signal Name
1	NC
2	TxD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC



## Input/Output

### - Dallas iButton interface:

The iButton interface is connected to P1.3 port with protection circuit and allows DS19XX iButtons to be detected, read and write. Sample assembly routine for iButton presence detection is included in the software for MSP430-1121STK in Olimex web page.

### - Frequency input:

The Frequency input is connected to P1.0/TACLK with protection circuit.

### - LEDs:

Two LEDs are connected to MSP430F1121. LED1 is placed left and connected to P2.3, LED2 is placed right and is connected to P2.4

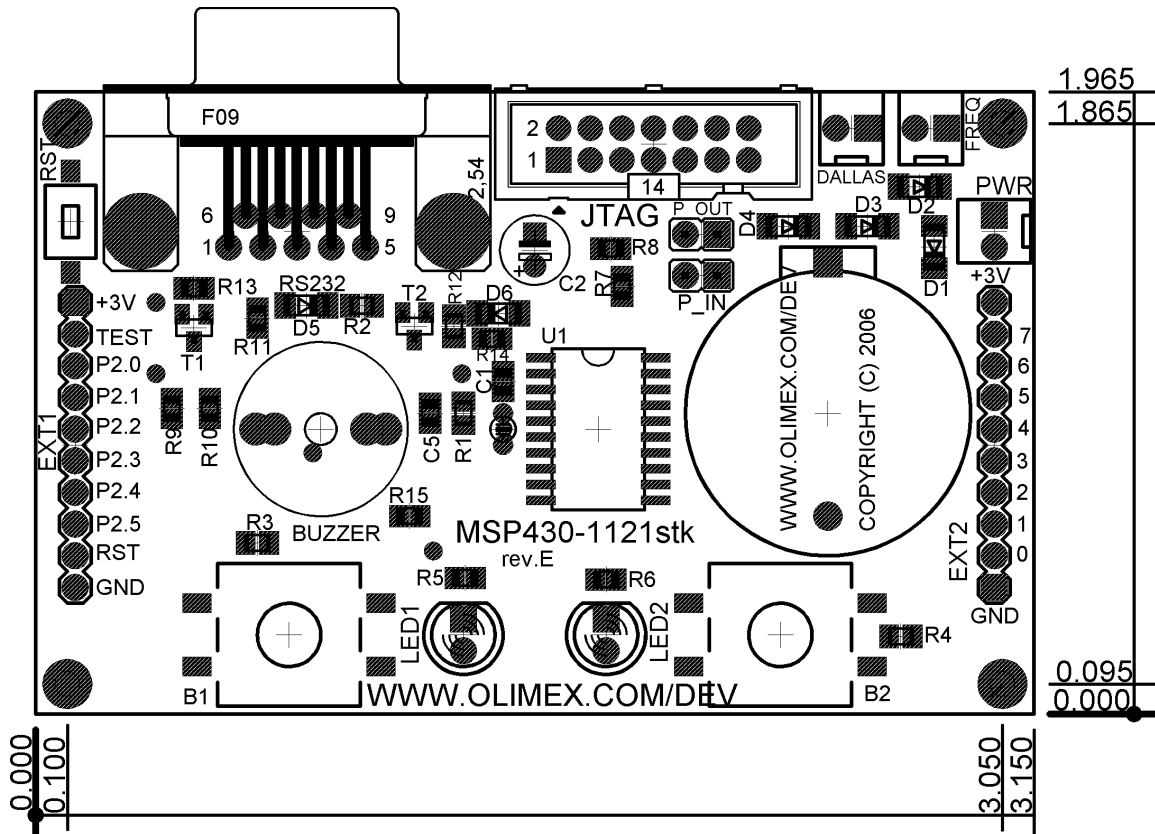
### - BUTTONS:

Two buttons are connected to MSP430F1121. B1 is placed left and connected to P2.1, B2 is placed right and is connected to P1.2

### - BUZZER:

Piezzo buzzer is connected between P2.0 and P2.5 ports. When the voltage between P2.0 and P2.5 is reversed the buzzer will chirp.

# MECHANICAL DIMENSIONS



- All measures are in inches.

## AVAILABLE DEMO SOFTWARE

- [msp430-1121stk.asm](#) test software for RS232 Tx/Rx, button scan, LED, buzzer, Dallas iButton check present
- [DCO calibration subroutine](#), useful when you need to know at what frequency MSP430 is running
- [Real Time Clock subroutine](#) - software implementation
- [I2C EEPROM subroutines](#) - 24xx eeprom subroutines
- [Uart subrotine](#) - software implementation of serial communication 9600,1,8,N

You could find MSP430-1121STK2 demo software at [www.olimex.com/dev](http://www.olimex.com/dev).

## **ORDER CODE**

MSP430-1121STK2 – assembled and tested (no kit, no soldering required).

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:**

REV. E - created      February 2006

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