

## MSP430-P2618 development board

## Users Manual

Rev.C, April 2009

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## INTRODUCTION:

MSP430-P2618 board is development kit for the new mixed signal MSP430F2618 microcontroller. It has LEDs, buttons, JTAG interface, RS232 interface and most of the GPIOs are on extension headers where you can connect your additional circuits.

## BOARD FEATURES:

- MCU: MSP430F2618 with 116 KB + 256 B Flash Memory, 8 KB RAM
- JTAG connector
- RS232 driver + RS232 connector
- User button
- Power supply LED
- User status LED
- 32 768 Hz oscillator crystal
- Optional high frequency crystal (socket)
- RESET button
- External power supply jack for AC or DC power supply
- Voltage regulator + power supply filtering capacitor
- Extension headers for all uC pins
- Prototype area with 0.2" step, Vcc + GND bus
- PCB: FR-4, 1.5 mm (0.062"), red soldermask, silkscreen component print
- Dimensions 99.38 x 79.31 mm (3.91 x 3.12")

## ELECTROSTATIC WARNING:

The **MSP430-P2618** 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:

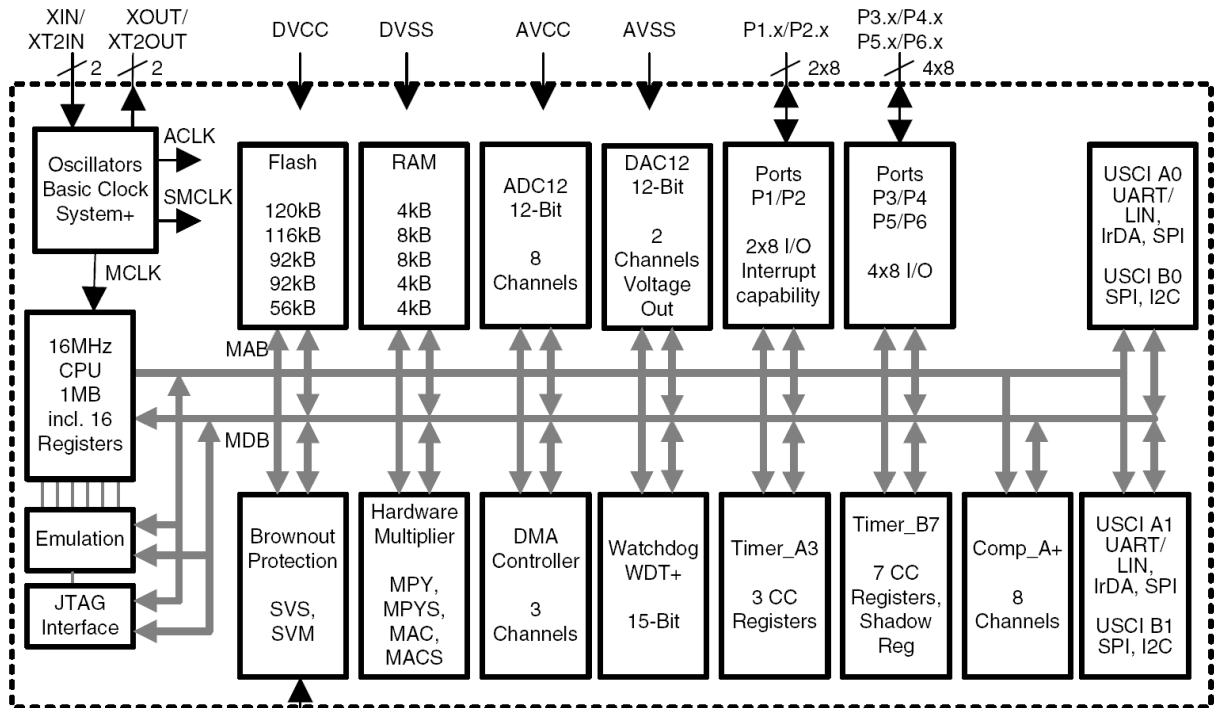
- Cables:** The cable you will need depends on the programmer/debugger you use. If you use MSP430-JTAG, you will need LPT cable. You will need 1.8 meter USB A-B cable to connect MSP430-JTAG-ISO or MSP430-JTAG-TINY to a USB host on your PC. If you use MSP430-JTAG-RF, you will not need a cable.
- Hardware:** Programmer/Debugger - one of the Olimex MSP430-JTAG tools: **MSP430-JTAG, MSP430-JTAG-ISO, MSP430-JTAG-TINY, MSP430-JTAG-RF.**
- Software:** **Olimex MSP430 programmer** - free stand-alone software which allows you to program MSP430 devices without any third party software; **MSP430 Kick Start C** compiler and debugger (free for assembly, limited for C); **MSPGCC** - free compiler and debugger. You will also need **drivers** for the JTAG programmer that you use (to be found on the corresponding web pages on our web site).

## PROCESSOR FEATURES:

**MSP430-P2618** board uses MCU **MSP430F2618** from Texas Instruments with these features:

- Low Supply Voltage Range, 1.8 V to 3.6 V
- Ultra-Low Power Consumption:
  - Active Mode: 365  $\mu$ A at 1 MHz, 2.2 V
  - Standby Mode: 0.5  $\mu$ A
  - Off Mode (RAM Retention): 0.1  $\mu$ A
- Wake-Up From Standby Mode in Less Than 1 $\mu$ s
- 16-Bit RISC Architecture, 62.5-ns Instruction Cycle Time
- Three-Channel Internal DMA
- 12-Bit Analog-to-Digital (A/D) Converter With Internal Reference, Sample-and-Hold, and Autoscan Feature
- Dual 12-Bit Digital-to-Analog (D/A) Converters With Synchronization
- 16-Bit Timer\_A With Three Capture/Compare Registers
- 16-Bit Timer\_B With Seven Capture/Compare-With-Shadow Registers
- On-Chip Comparator
- Four Universal Serial Communication Interfaces (USCIs)
  - USCI\_A0 and USCI\_A1
    - Enhanced UART Supporting Auto-Baudrate Detection
    - IrDA Encoder and Decoder
    - Synchronous SPI
  - USCI\_B0 and USCI\_B1
    - I<sup>2</sup>C
    - Synchronous SPI
- Supply Voltage Supervisor/Monitor With Programmable Level Detection
- Brownout Detector
- Bootstrap Loader
- Serial Onboard Programming, No External Programming Voltage Needed
- Programmable Code Protection by Security Fuse
- 116KB+256B Flash Memory, 8KB RAM

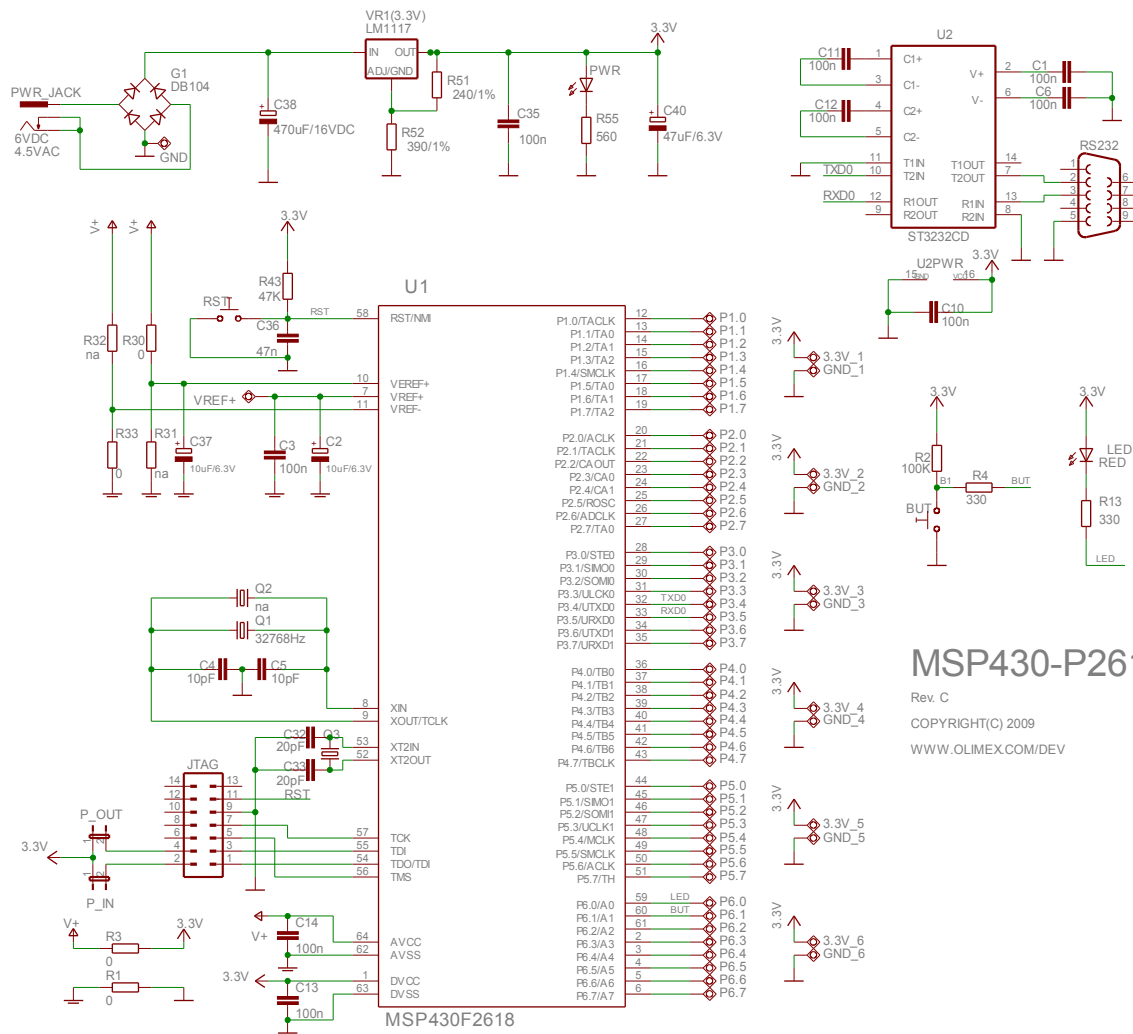
# BLOCK DIAGRAM:



**MEMORY MAP:**

		<b>MSP430F2618</b>
Memory	Size	116KB
Main: interrupt vector	Flash	0x0FFFF - 0x0FFC0
Main: code memory	Flash	0x1FFFF - 0x03100
RAM (total)	Size	8kB
Extended	Size	0x030FF - 0x01100 6kB
Mirrored	Size	0x030FF - 0x01900 2kB
Information memory	Size	256 Byte
	Flash	0x010FF - 0x01000
Boot memory	Size	1KB
	ROM	0x00FFF - 0x00C00
RAM (mirrored at 0x18FF to 0x01100)	Size	2KB
		0x009FF - 0x00200
Peripherals	16-bit	0x001FF - 0x00100
	8-bit	0x000FF - 0x00010
	8-bit SFR	0x0000F - 0x00000

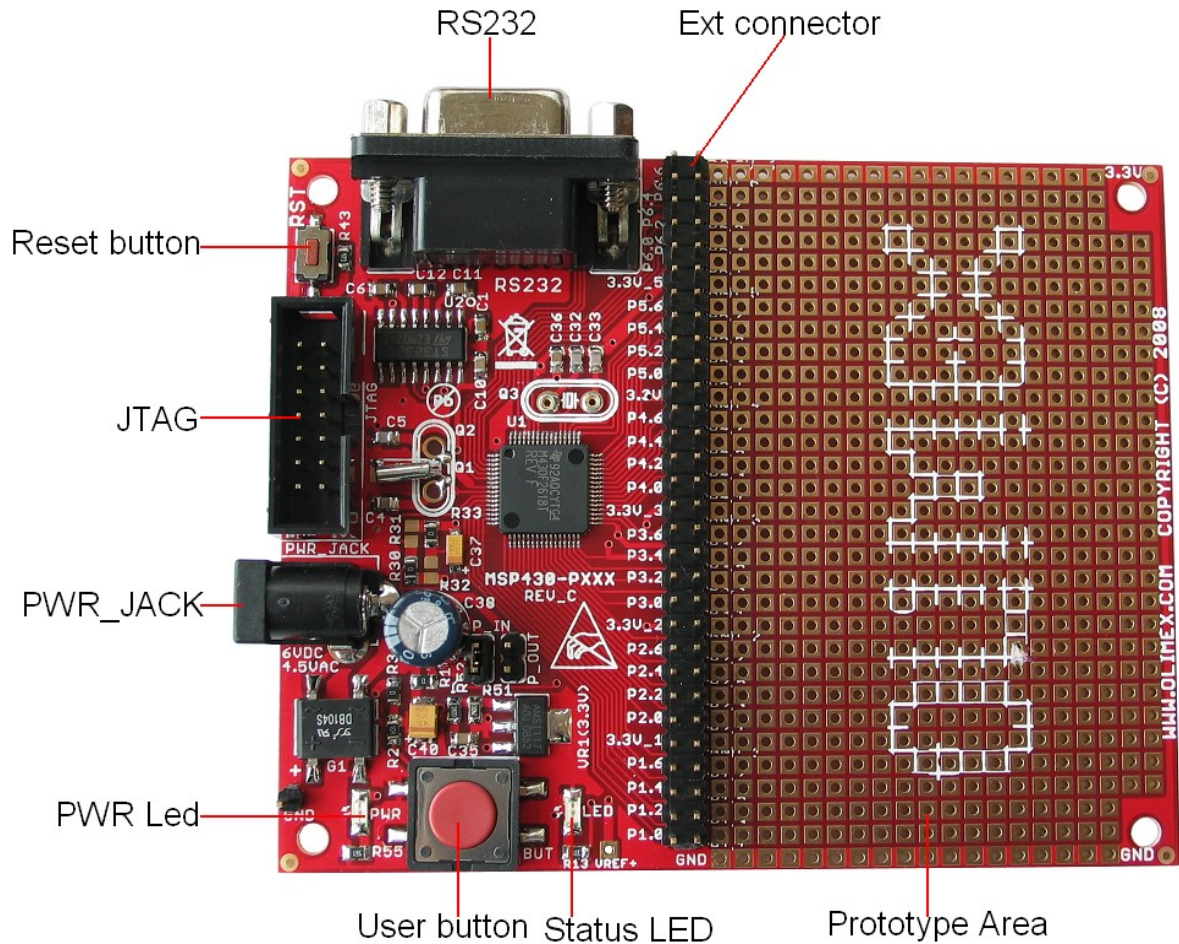
# SCHEMATIC:



MSP430-P2618

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## BOARD LAYOUT:



## POWER SUPPLY CIRCUIT:

**MSP430-P2618** is typically power supplied from the JTAG interface (P\_IN closed). If not, you could power supply the board if you apply +6VDC or 4.5VAC at the PWR pin 1 and GND at PWR pin 2.

The board power consumption is about 20 mA but may be greater depending on the running peripherals.

## RESET CIRCUIT:

**MSP430-P2618** reset circuit is realized with a RST pull-up resistor R43 (47k) and capacitor C36(47n). You could also reset the MCU with an active low level at the JTAG pin 11.

## CLOCK CIRCUIT:

Quartz crystal 32 768 Hz is connected to **MSP430F2618** pin 8 (XIN) and pin 9 (XOUT/TCLK).

There is socket left for a high frequency crystal that would be connected to **MSP430F2618** pin 52 (X2OUT) and pin 53 (X2IN).

## 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:

**User Button** with name **BUT** connected to **MSP430F2618** pin 60 (P6.1/A1).

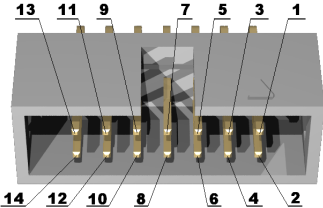
**Reset button** with name **RST** connected to **MSP430F2618** pin 58 (RST/NMI).

**Power LED** with name **PWR** - shows that the board is power supplied.

**Status red LED** with name **LED** connected to **MSP430F2618** pin 59 (P6.0/A0).

**EXTERNAL CONNECTORS DESCRIPTION:**

**JTAG:**

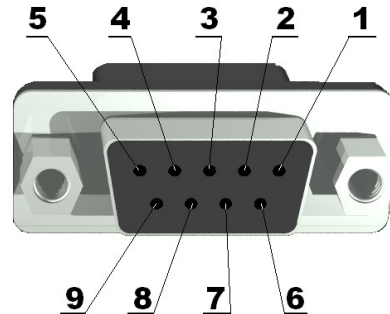


Pin #	Signal Name	Pin#	Signal Name
1	TDO	2	P_IN
3	TDI	4	P_OUT
5	TMS	6	NC
7	TCK	8	NC
9	GND	10	NC
11	RST	12	NC
13	NC	14	NC

- 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.

## RS232:

Pin #	Signal Name
1	NC
2	T2OUT
3	R1IN
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

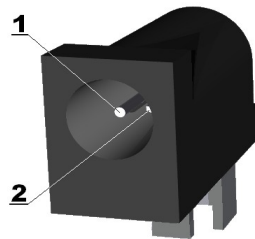


**T2OUT**  
**R1IN**

Output **Transmit Data**. This is the transmit data line for the RS232 interface.  
Input **Receive Data**. This is the receive data line for the RS232 interface.

## PWR:

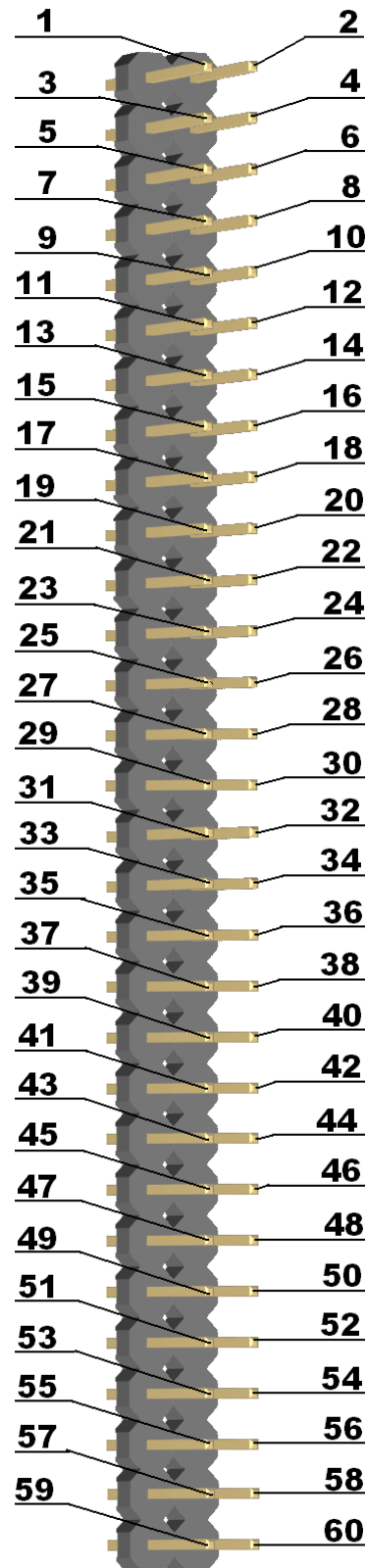
Pin #	Signal Name
1	PWR
2	GND



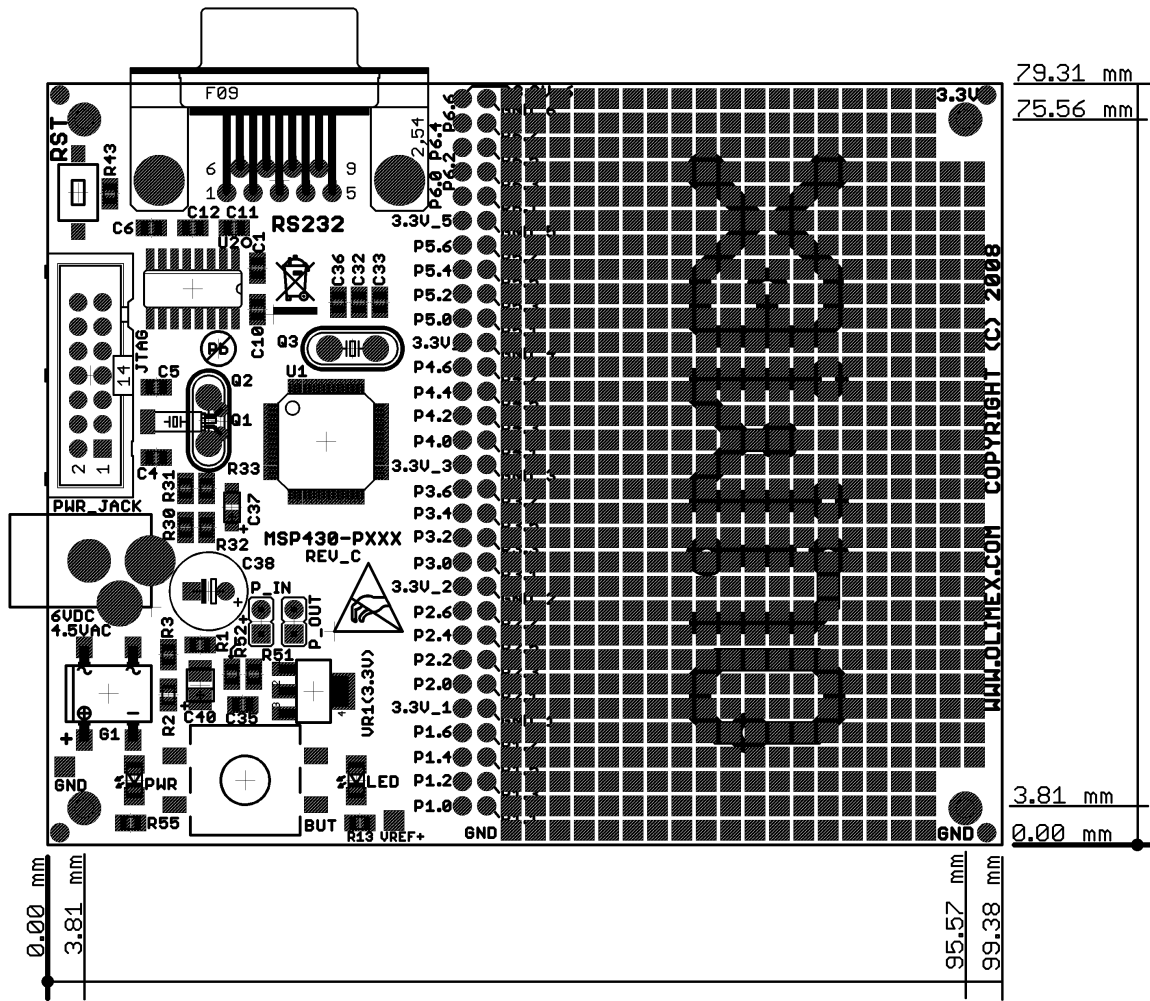
This is the Power connector. If you don't want to use the JTAG interface to supply the board, you should apply either +6VDC or 4.5VAC at pin 1 and GND at pin 2.

**EXT:**

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	GND
3	P6.6	4	P6.7
5	P6.4	6	P6.5
7	P6.2	8	P6.3
9	P6.0	10	P6.1
11	VCC	12	GND
13	P5.6	14	P5.7
15	P5.4	16	P5.5
17	P5.2	18	P5.3
19	P5.0	20	P5.1
21	VCC	22	GND
23	P4.6	24	P4.7
25	P4.4	26	P4.5
27	P4.2	28	P4.3
29	P4.0	30	P4.1
31	VCC	32	GND
33	P3.6	34	P3.7
35	P3.4/TXD0	36	P3.5/RXD0
37	P3.2	38	P3.3
39	P3.0	40	P3.1
41	VCC	42	GND
43	P2.6	44	P2.7
45	P2.4	46	P2.5
47	P2.2	48	P2.3
49	P2.0	50	P2.1
51	VCC	52	GND
53	P1.6	54	P1.7
55	P1.4	56	P1.5
57	P1.2	58	P1.3
59	P1.0	60	P1.1



# MECHANICAL DIMENSIONS:



## **AVAILABLE DEMO SOFTWARE:**

- MSP430-P2618\_Blinking\_Led
- MSP430-P2618\_Button & Led
- MSP430-P2618\_USART

You could find information about MSP430-P2618 demo software at [www.olimex.com/dev](http://www.olimex.com/dev).

## **ORDER CODE:**

MSP430-P2618 – 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.



All boards produced by Olimex are RoHS compliant

## **Revision history:**

REV.C - created      April 2009

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