

MSP430-H5438 development board

Users Manual



All boards produced by Olimex are ROHS compliant

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INTRODUCTION

MSP430-H5438 is entry level development board for the new MSP430F5438 mixed signal microcontroller produced by Texas Instruments.

MSP430-H5438 has JTAG port for programming and debugging and most of the GPIOs are on extension headers where you can connect your additional circuits.

BOARD FEATURES

- CPU: MSP430F5438 mixed signal microcontroller
- JTAG connector
- JTAG Power_In and Power_Out jumpers
- Extension connectors
- PCB: FR-4, 1.5 mm (0,062"), solder mask, silkscreen component print
- Dimensions: 45x45mm (1.77x1.77")

ELECTROSTATIC WARNING

The MSP430-H5438 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, if you use MSP430-JTAG-TINY or MSP-JTAG-ISO, you will need 1.8m A-B USB cable, if you use MSP430-JTAG-RF, you can connect it to the USB port of your computer, or via USB cable type A - female.

Hardware: Programmer/Debugger - one of our Programmers - [MSP430-JTAG](#), [MSP430-JTAG-TINY](#), [MSP430-JTAG-ISO](#), or [MSP430-JTAG-RF](#).

Software: MSP430 KickStart software.

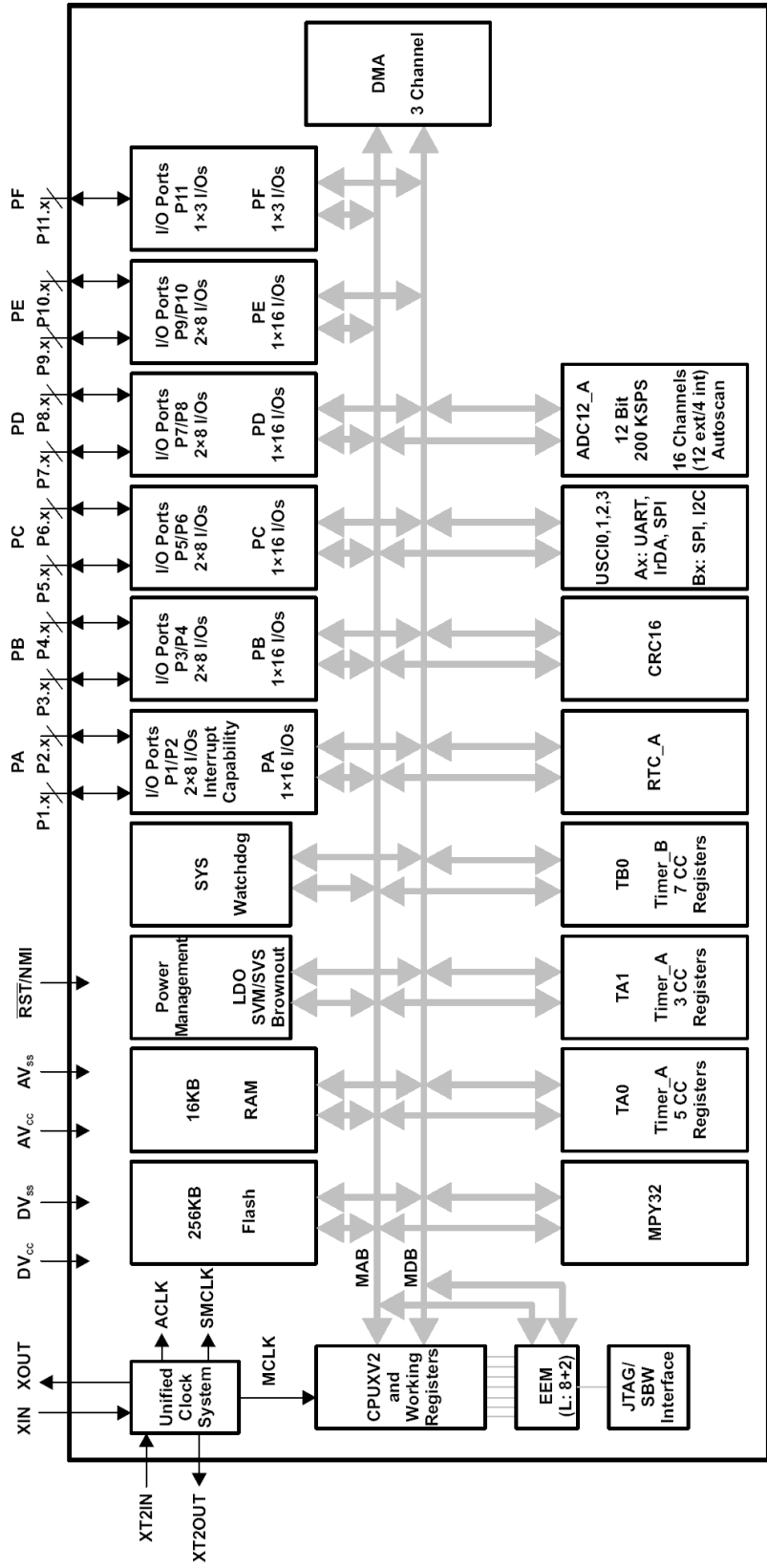
PROCESSOR FEATURES

MSP430-H5438 board use ultralow-power consumption mixed signal microcontroller with these features:

- 256KB+512B Flash Memory
- 16KB RAM
- Four Universal Serial Communication Interfaces
- Low Supply Voltage Range
 - 1.8 V to 3.6 V
- Ultralow Power Consumption
 - Active Mode (AM): 165 mA/MHz at 8 MHz
 - Standby Mode (LPM3 RTC Mode): 2.60 mA
 - Off Mode (LPM4 RAM Retention): 1.69 mA
 - Shutdown Mode (LPM5): 0.1 mA
- Wake-Up From Standby Mode in Less Than 5 ms
- 16-Bit RISC Architecture
 - Extended Memory
 - 18-MHz System Clock
- Flexible Power Management System
 - Fully Integrated LDO With Programmable Regulated Core Supply Voltage
 - Supply Voltage Supervision, Monitoring, and Brownout
- Unified Clock System
 - FLL Control Loop for Frequency Stabilization
 - Low-Power/Low-Frequency Internal Clock Source (VLO)
 - Low-Frequency Trimmed Internal Reference Source (REFO)
 - 32-kHz Crystals
 - High-Frequency Crystals up to 32 MHz
- 16-Bit Timer TA0, Timer_A With Five Capture/Compare Registers
- 16-Bit Timer TA1, Timer_A With Three Capture/Compare Registers
- 16-Bit Timer TB0, Timer_B With Seven Capture/Compare Shadow Registers
- Up to Four Universal Serial Communication Interfaces
 - Enhanced UART Supporting Auto-Baudrate Detection
 - IrDA Encoder and Decoder
 - Synchronous SPI
 - I2C™
- 12-Bit Analog-to-Digital (A/D) Converter

- Internal Reference
 - Sample-and-Hold
 - Autoscan Feature
 - 12 External Channels, 4 Internal Channels
- Hardware Multiplier Supporting 32-Bit Operations
- Serial On-board Programming, No External Programming Voltage Needed
- Three Channel Internal DMA
- Basic Timer With Real-Time Clock Feature

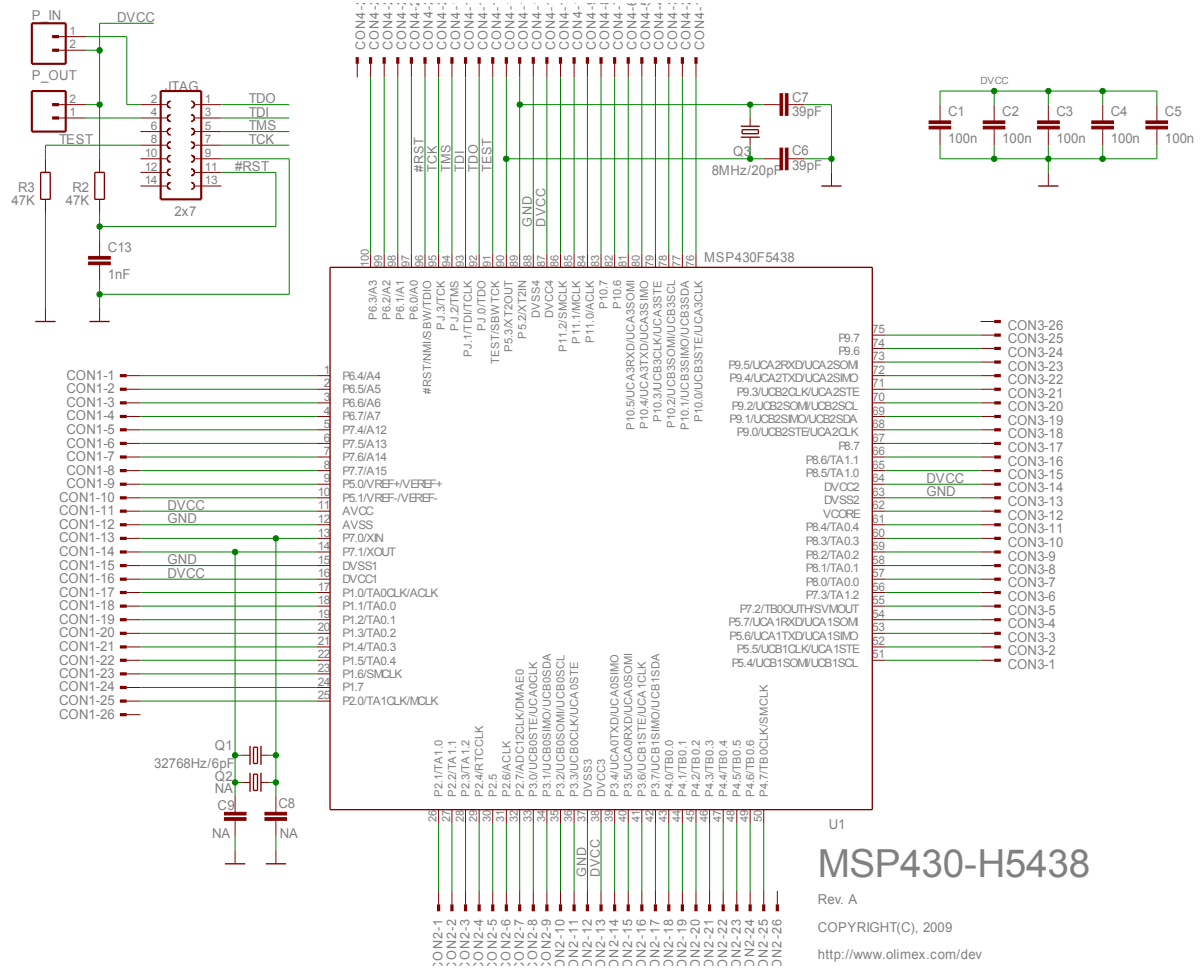
BLOCK DIAGRAM



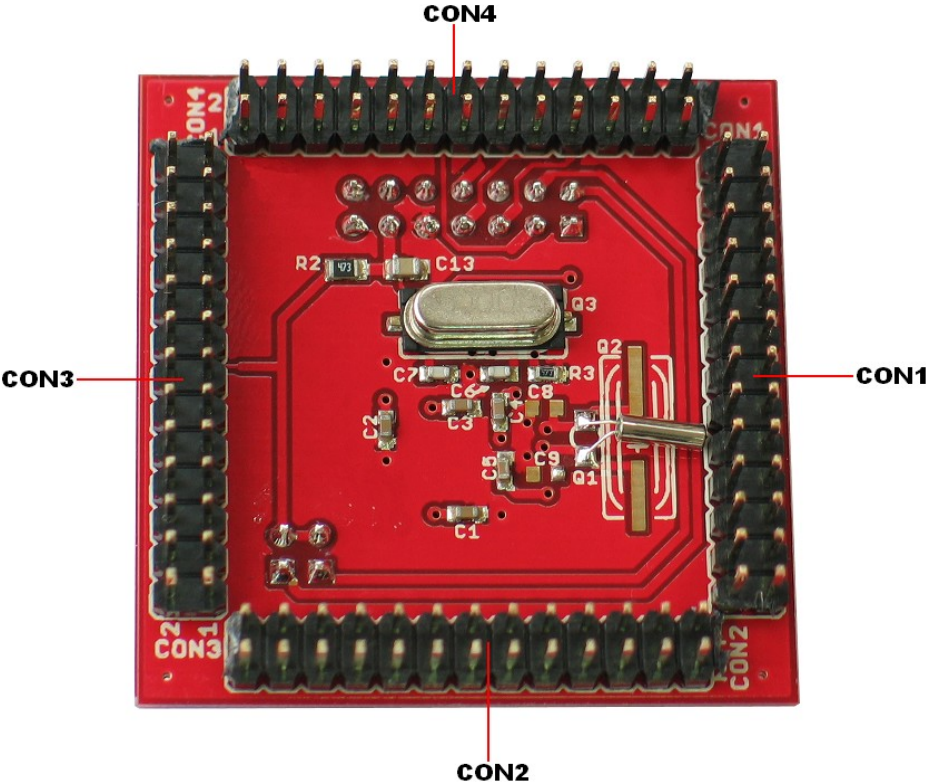
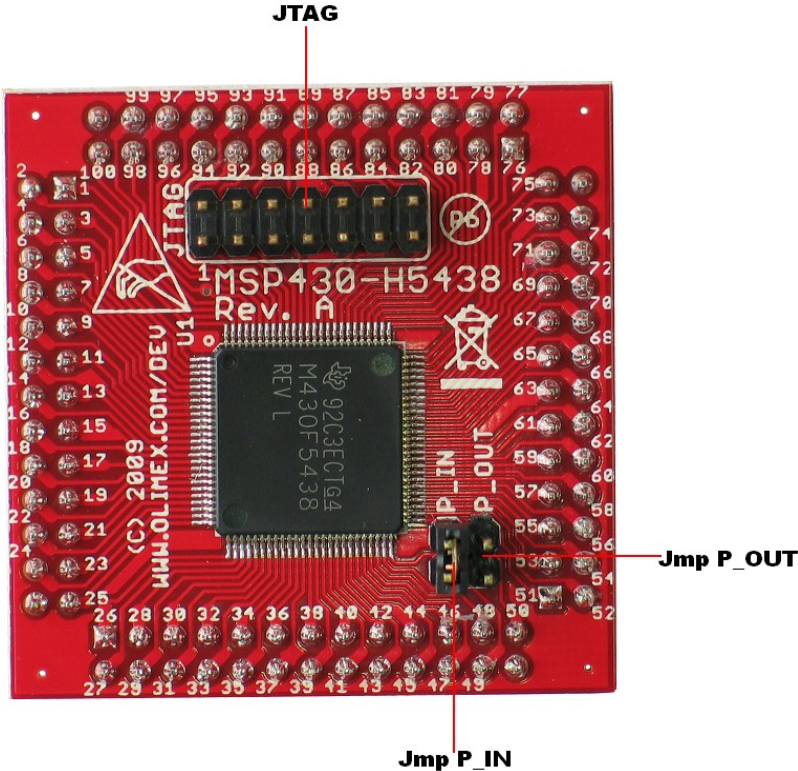
MEMORY ORGANIZATION

		MSP430F5438
Memory (flash) Main: interrupt vector Main: code memory	Total Size Flash Flash	256 KB 00FFFFh–00FF80h 045BFFh–005C00h
Main: code memory	Bank 3	64 KB 03FFFFh–030000h
	Bank 2	64 KB 02FFFFh–020000h
	Bank 1	64 KB 01FFFFh–010000h
	Bank 0	64 KB 045BFFh–040000h 00FFFFh–005C00h
RAM	Size	16 KB
	Sector 3	4 KB 005BFFh–004C00h
	Sector 2	4 KB 004BFFh–003C00h
	Sector 1	4 KB 003BFFh–002C00h
	Sector 0	4 KB 002BFFh–001C00h
Information memory (Flash)	Info A	128 B 0019FFh–001980h
	Info B	128 B 00197Fh–001900h
	Info C	128 B 0018FFh–001880h
	Info D	128 B 00187Fh–001800h
Bootstrap loader (BSL) memory (Flash)	BSL 3	512 B 0017FFh–001600h
	BSL 2	512 B 0015FFh–001400h
	BSL 1	512 B 0013FFh–001200h
	BSL 0	512 B 0011FFh–001000h
Peripherals	Size	4KB 000FFFh–000000h

SCHEMATIC



BOARD LAYOUT



POWER SUPPLY CIRCUIT

MSP430-H5438 can take power from two sources:

- JTAG, when P_IN jumper is closed.
- EXT connectors, when P_OUT jumper is closed.

RESET CIRCUIT

MSP430-H5438 reset circuit includes JTAG connector pin 11, CON4 pin 21
MSP430F5438 pin 96.

CLOCK CIRCUIT

Quartz crystal 32768 MHz is connected to **MSP430F5438** pin 13(P7.0/XIN) and pin 14 (P7.1/XOUT).

Quartz crystal 8 MHz is connected to **MSP430F5438** pin 89 (P5.2/XT2IN) and pin 90 (P5.3/XT2OUT).

JUMPER DESCRIPTION

Power In jumper:

P_IN jumper connects power supply from JTAG connector. You have to ensure that your circuit doesn't draw more than few milliampers current or the power supply may decrease due to the JTAG port current limitations. **P_IN** is useful and must be used mostly to program the microcontroller.

Power Out jumper:

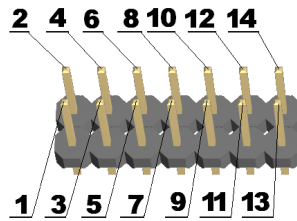
P_OUT jumper connects power from **MSP430-H5438** to JTAG connector. When this jumper cap is placed, the power supply of JTAG connector will follow the power supply of the board. This is useful when your board works at lower than +3,3V power supply, or consume more than few mA current.

Note:

P_IN and **P_OUT** jumper caps should not be placed at the same time.

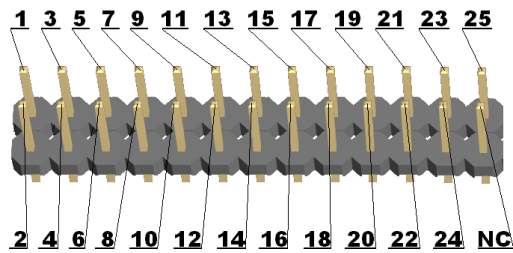
CONNECTOR DESCRIPTIONS

JTAG



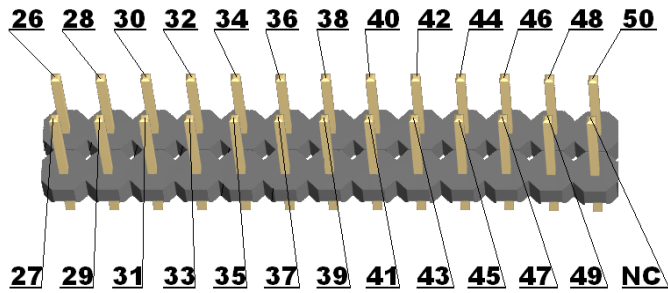
Pin #	Signal Name	Pin #	Signal Name
1	TDO	2	VCC_IN
3	TDI	4	VCC_OUT
5	TMS	6	NC
7	TCK	8	TEST
9	GND	10	NC
11	#RST	12	NC
13	NC	14	NC

CON1



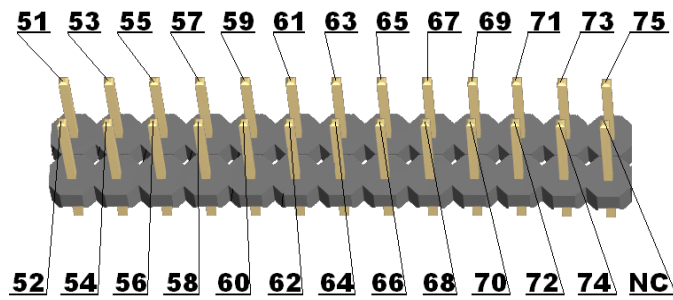
Pin #	Signal Name	Pin #	Signal Name
1	CON1-1	2	CON1-2
3	CON1-3	4	CON1-4
5	CON1-5	6	CON1-6
7	CON1-7	8	CON1-8
9	CON1-9	10	CON1-10
11	DVCC	12	GND
13	CON1-13	14	CON1-14
15	GND	16	DVCC
17	CON1-17	18	CON1-18
19	CON1-19	20	CON1-20
21	CON1-21	22	CON1-22
23	CON1-23	24	CON1-24
25	CON1-25	NC	Not Connected

CON2



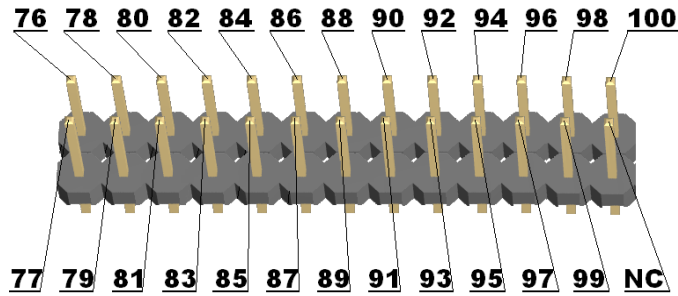
Pin #	Signal Name	Pin #	Signal Name
26	CON2-1	27	CON2-2
28	CON2-3	29	CON2-4
30	CON2-5	31	CON2-6
32	CON2-7	33	CON2-8
34	CON2-9	35	CON2-10
36	CON2-11	37	GND
38	DVCC	39	CON2-14
40	CON2-15	41	CON2-16
42	CON2-17	43	CON2-18
44	CON2-19	45	CON2-20
46	CON2-21	47	CON2-22
48	CON2-23	49	CON2-24
50	CON2-25	NC	Not Connected

CON3



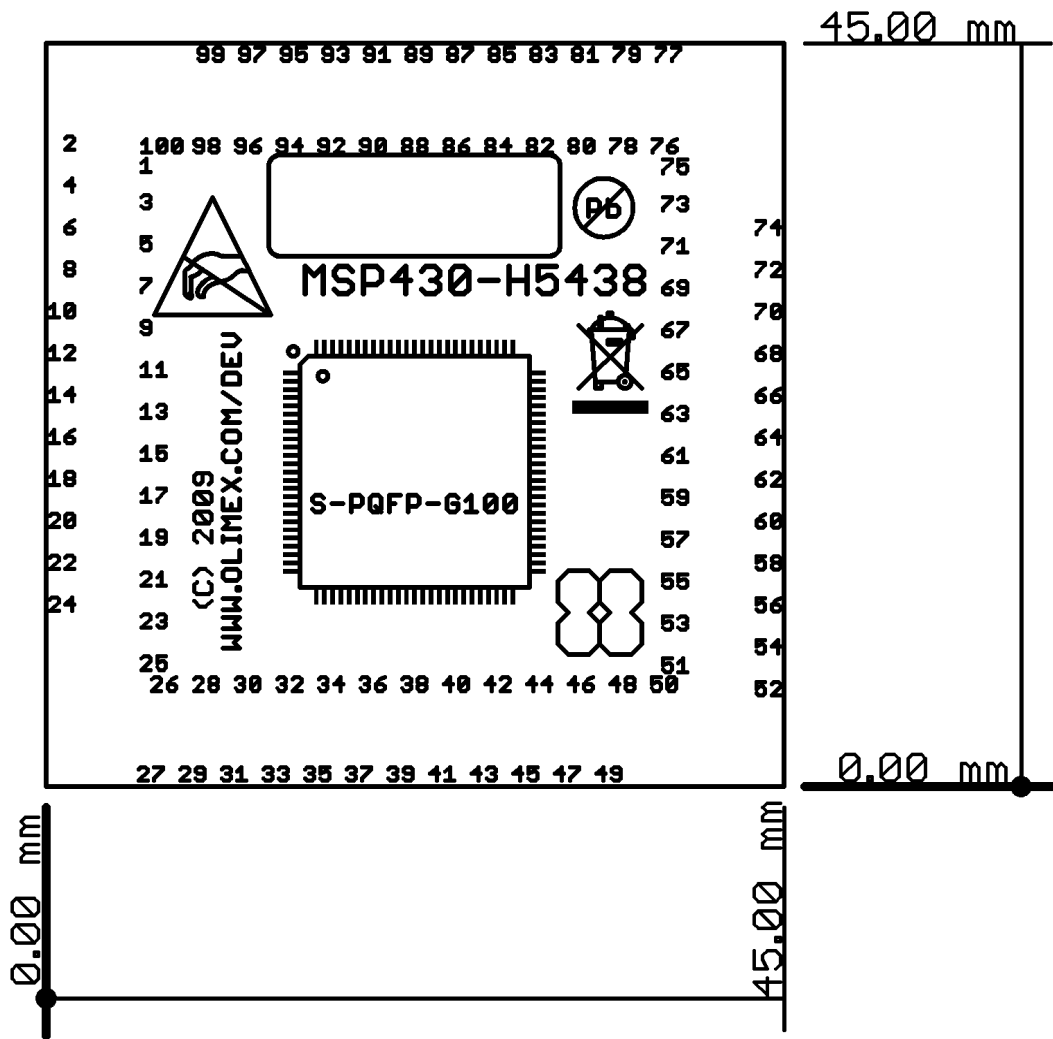
Pin #	Signal Name	Pin #	Signal Name
51	CON3-1	52	CON3-2
53	CON3-3	54	CON3-4
55	CON3-5	56	CON3-6
57	CON3-7	58	CON3-8
59	CON3-9	60	CON3-10
61	CON3-11	62	CON3-12
63	GND	64	DVCC
65	CON3-15	66	CON3-16
67	CON3-17	68	CON3-18
69	CON3-19	70	CON3-20
71	CON3-21	72	CON3-22
73	CON3-23	74	CON3-24
75	CON3-24	NC	Not Connected

CON4



Pin #	Signal Name	Pin #	Signal Name
76	CON4-1	77	CON4-2
78	CON4-3	79	CON4-4
80	CON4-5	81	CON4-6
82	CON4-7	83	CON4-8
84	CON4-9	85	CON4-10
86	CON4-11	87	DVCC
88	GND	89	CON4-14
90	CON4-15	91	TEST
92	TDO	93	TDI
94	TMS	95	TCK
96	#RST	97	CON4-22
98	CON4-23	99	CON4-24
100	CON4-25	NC	Not Connected

MECHANICAL DIMENSIONS



AVAILABLE DEMO SOFTWARE

- MSP430-H5438_Blinking_Led

ORDER CODE

MSP430-H5438 – assembled and tested

How to order?

You can order to us directly or by any of our distributors.

Check our web www.olimex.com/dev for more info.

Revision history:

REV.A - create July 2009

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