MSP430-GBD development board

Users Manual

Rev.A, November 2009
Copyright(c) 2009, OLIMEX Ltd, All rights reserved

INTRODUCTION

MSP430-GBD development board is example how digital signal processing may be done with low cost and low power MSP430 microcontrooler, the design is based on TI Application notes: SLAA351 Simple Glasbreak detector and SLAA389 Robust Glasbreak detector

Application software make it like simple glass break detector. There is led and buzzer indication when glass break is detected. The board can be used as sensor evaluation, introduction to digital filtering basis. The sources are available and can bemodified by the user for their own further development.

BOARD FEATURES

- CPU: MSP430F2274 mixed signal microcontroller
- JTAG connector
- UEXT connector
- Microphone
- Buzzer
- 3 V lithium battery connector
- Status LED
- PCB: FR-4, 1.5 mm (0,062"), solder mask, silkscreen component print
- Dimensions: 41.9x40.6 mm (1.650x 1.599")

ELECTROSTATIC WARNING

The MSP430-GBD 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.
Note: If you use MSP430-JTAG-RF – be sure that your battery gives power supply 3V, because if it is lower – MSP430-JTAG-RF may not work.

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-GBD board use ultralow-power mixed signal microcontroller with two built-in 16-bit timers, a universal serial communication interface, 10-bit A/D converter with integrated reference and data transfer controller (DTC), two general-purpose operational amplifiers, 32 GPIO with these features:

– 32KB + 256B Flash Memory

– 1KB RAM

– Low Supply Voltage Range: 1.8 V to 3.6 V

– Ultralow Power Consumption

  – Active Mode: 270 µA at 1 MHz, 2.2 V

  – Standby Mode: 0.7 µA

  – Off Mode (RAM Retention): 0.1 µA

– Ultrafast Wake-Up From Standby Mode in Less Than 1 µs

– 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 ±1%

  – Internal Very-Low-Power Low-Frequency Oscillator

  – 32-kHz Crystal

- High-Frequency Crystal 16 MHz

- Resonator

- External Digital Clock Source

- External Resistor

- 16-Bit Timer_A With Three Capture/Compare Registers

- 16-Bit Timer_B With Three Capture/Compare Registers

- Universal Serial Communication Interface

  - Enhanced UART Supporting Auto-Baudrate Detection (LIN)

  - IrDA Encoder and Decoder

  - Synchronous SPI

  - I^2C^{TM}

- 10-Bit 200-ksps Analog-to-Digital (A/D) Converter With Internal Reference,Sample-and-Hold, Autoscan, and Data Transfer Controller

- Two Configurable Operational Amplifiers

- Brownout Detector

- Serial Onboard Programming, No External Programming Voltage Needed Programmable Code Protection by Security Fuse

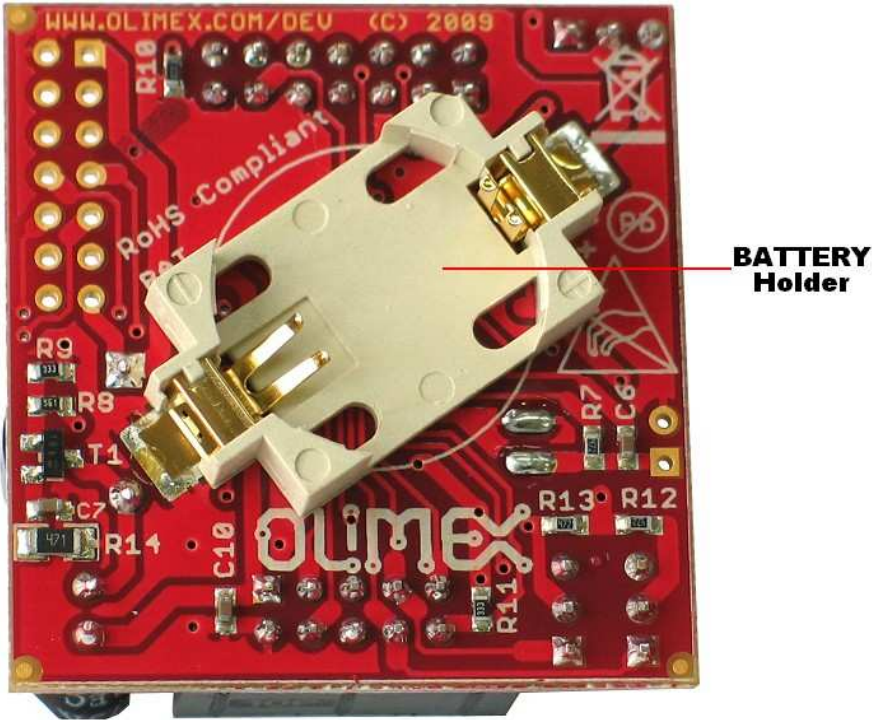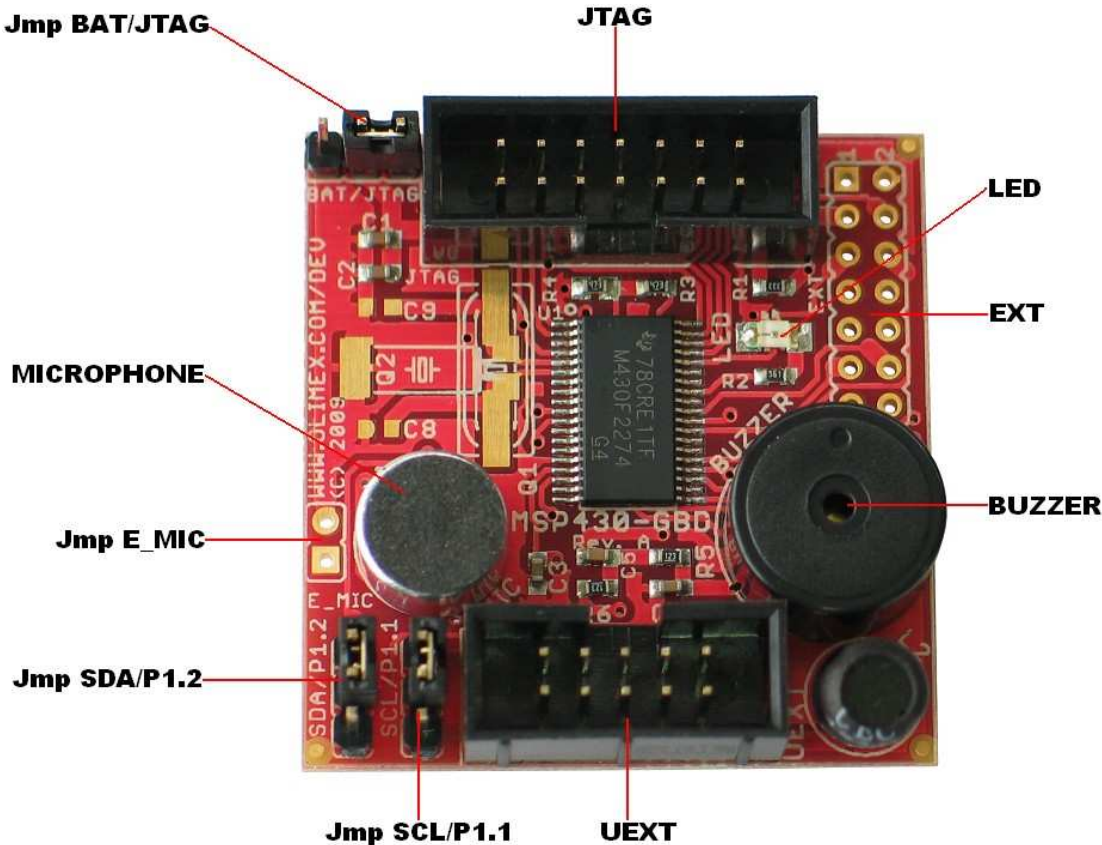- Bootstrap Loader

- On Chip Emulation Module

BLOCK DIAGRAM
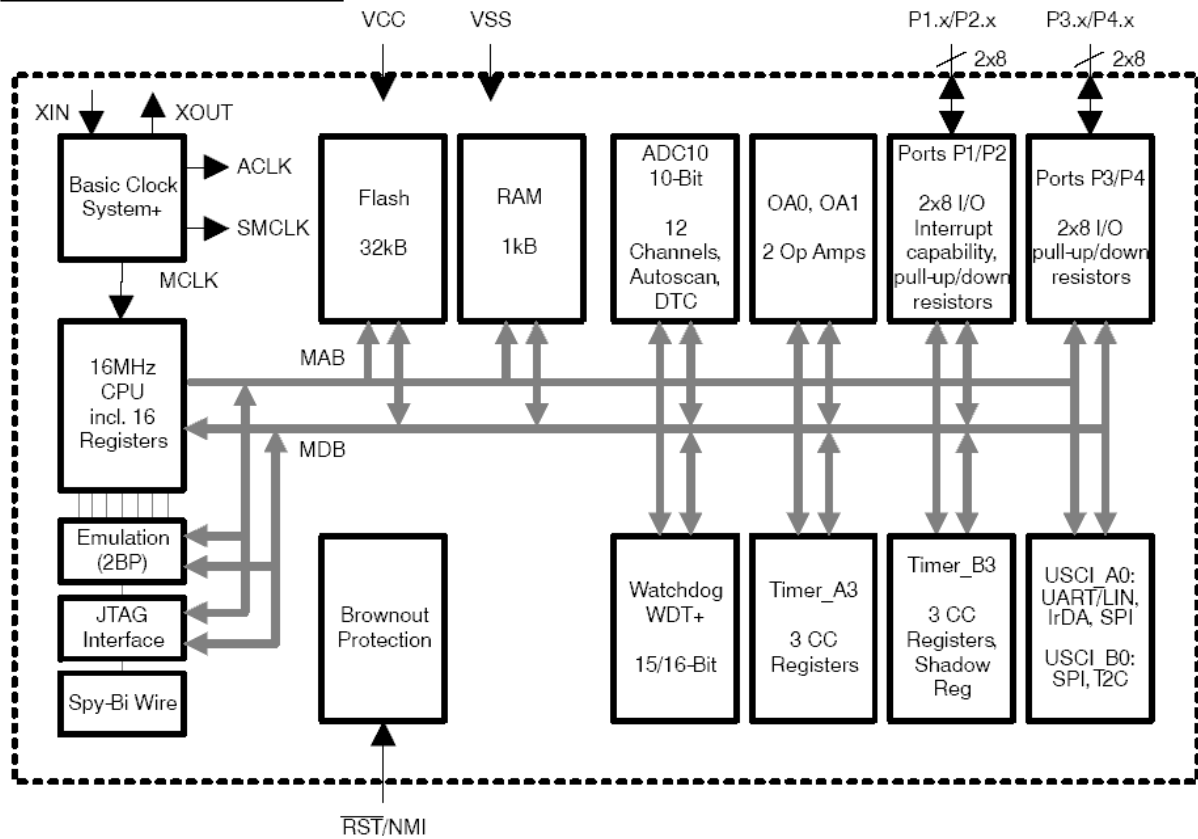
MEMORY ORGANIZATION

		MSP430F2274
Memory Main: interrupt vector Main: code memory	Size Flash Flash	32KB Flash 0FFFFh–0FFC0h 0FFFFh–08000h
Information memory	Size Flash	256 Byte 010FFh–01000h
Boot memory	Size ROM	1KB 0FFFh–0C00h
RAM	Size	1KB 05FFh–0200h
Peripherals	16-bit 8-bit 8-bit SFR	01FFh–0100h 0FFh–010h 0Fh–00h

VCC

BUZZER
PT1240P
4.1KHz

L2
47mH

C2
100nF

VCC

VCC_MIC

R7
4.7k/5%

C6
1uF/5%

U1

DVCC
DVSS

P2.0/ACLK/A0/OA0I0   OA0I0
P2.1/TAINCLK/SMCLK/A1/OA0O   OA0O
P2.2/TA0/A2/OA0I1   OA0I1
P2.3/TA1/A3/VREF-/VEREF-/OA1I1/OA1O
P2.4/TA2/A4/VREF+/VEREF+/OA1I0   VREF+   EXT-12

R3
47k/1%

R4
47k/1%

MIC

T1
BC846

R8
560R/5%   BUZZ

AVCC
AVSS

C3
100nF

P3.0/UCB0STE/UCA0CLK/A5   STE
P3.1/UCB0SIMO/UCB0SDA   MOSI/SDA
P3.2/UCB0SOMI/UCB0SCL   MISO/SCL
P3.3/UCB0CLK/UCA0STE   CLK
P3.4/UCA0TXD/UCA0SIMO   TXD
P3.5/UCA0RXD/UCA0SOMI   RXD

AMF-097A44-NBAB

E_MIC

C7
100nF

R14
470R/5%

R9
33k/5%

R1
33k/5%   EXT-4

P2.5/ROSC
XIN/P2.6   XIN
XOUT/P2.7   XOUT

P3.6/A6/OA0I2   BUZZ   EXT-11
P3.7/A7/OA1I2

NA(HN1x2(Open))

R6
12k/1%

EXT-3

#RST/SWBTDIO
TEST/SWBTCK

#RST/NMI/SBWTDIO
TEST/SBWTCK

VCC_MIC

R5
12k/1%

JTAG

14 13
12 11
10   9
 8   7
 6   5
 4   3
 2   1

#RST/SWBTDIO

LED
P1.1
P1.2

TCK   EXT-5
TMS
TDI
TDO

LED
P1.1
P1.2

TCK
TMS
TDI
TDO

P1.0/TACLK/ADC10CLK
P1.1/TA0
P1.2/TA1
P1.3/TA2
P1.4/SMCLK/TCK
P1.5/TA0/TMS
P1.6/TA1/TDI
P1.7/TA2/TDO/TDI

P4.0/TB0
P4.1/TB1   EXT-10
P4.2/TB2   EXT-9
P4.3/TB0/A12/OA0O   EXT-8
P4.4/TB1/A13/OA1O   OA1O   C5
P4.5/TB2/A14/OA0I3   10nF/5%   EXT-7
P4.6/TBOUTH/A15/OA1I3   OA1I3
P4.7/TBCLK   EXT-6

R10
33k/5%

VCC

BH14S

MSP430-GBD

MSP430F2274IDA

C4
4.7nF/5%

Rev. A

COPYRIGHT(C), 2009

http://www.olimex.com/dev

VCC

BAT/JTAG

1
2
3

EXT-1   NA(HN2x7)
EXT-13   NA(HN2x7)

LED

XTAL Option

C8
NA

XIN

UEXT

VCC   VCC

C10 100nF

VCC VCC

R2
560R/5%

Q1
NA

R13
4.7k/5%

R12
4.7k/5%

R11
33k/5%

HN1x3(BAT:Open, JTAG:Close)

C1
100nF

+ BAT

BTH-V-20LF

LED
RED(KP-3216EC)

Q2
NA

C9
NA

XOUT

UEXT

1   2
3   4
5   6
7   8
9   10

P1.1

TXD
SCL
MISO/SCL
CLK

RXD
SDA
MOSI/SDA
STE

P1.2

SDA/P1.2

SCL/P1.1

EXT-2   NA(HN2x7)
EXT-14   NA(HN2x7)

HN1x3(SCL:Open, P1.1:Close)   BH10S   HN1x3(SDA:Open, P1.2:Close)

BOARD LAYOUT

Jmp BAT/JTAG — JTAG — LED — EXT — MICROPHONE — Jmp E_MIC — BUZZER — Jmp SDA/P1.2 — Jmp SCL/P1.1 — UEXT

BATTERY Holder

POWER SUPPLY CIRCUIT

MSP430-GBD can take power from two sources:

– Battery, when jumper BAT/JTAG is in position BAT.

– JTAG, when jumper BAT/JTAG is in position JTAG.

RESET CIRCUIT

MSP430-GBD reset circuit includes JTAG connector pin 11, EXT pin 3, MSP430F2274 pin 7 (#RST/NMI/SBWTDIO).

CLOCK CIRCUIT

There is XTAL option for the customer. You can connect quartz crystal to MSP430F2274 pin 5 (XOUT/P2.7) and pin 6 (XIN/P2.6).

JUMPER DESCRIPTION

SDA/P1.2

Give user choice to select UEXT SDA connection between P1.2 or MOSI/SDA. Default state is P1.2.

SCL/P1.1

Give user choice to select UEXT SCL connection between P1.1 or MISO/SCL. Default state is P1.1.

BAT/JTAG

Give user opportunity to select between battery power supply or JTAG power supply. Default state is JTAG.

E_MIC

Give user opportunity to connect external microphone instead on-board microphone. Default state is not connected.

INPUT/OUTPUT

Status LED (red) with name **LED** - light indication for recognizing glass breakage, connected to MSP430F2274 pin 31 (P1.0).
BUZZER – audio indication for glass breakage, connected to MSP430F2274 pin 28 (P3.7)
MIC - on-board microphone – sensor for recognizing glass breakage, connected to MSP430F2274 pin 17 (P4.0) - VCC_MIC, through R7(4.7k) and pin 10 (DA0I1), through C(1uF).

CONNECTOR DESCRIPTIONS

JTAG
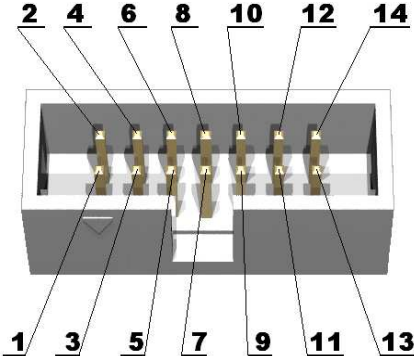
Pin #	Signal Name	Pin #	Signal Name
1	TDO	2	VCC_JTAG
3	TDI	4	VCC
5	TMS	6	NC
7	TCK	8	TEST/SWBTCK
9	GND	10	NC
11	#RST/SWBTDIO	12	NC
13	NC	14	NC

EXT

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	GND
3	#RST/SWBTDIO	4	P2.5
5	P1.3	6	P4.7
7	P4.5	8	P4.3
9	P4.2	10	P4.1
11	P3.6	12	P2.3
13	VCC	14	GND
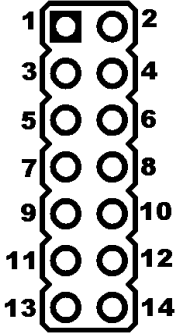
UEXT

Pin #	Signal Name
1	VCC
2	GND
3	TXD
4	RXD
5	SCL
6	SDA
7	MISO/SCL
8	MOSI/SDA
9	CLK
10	STE
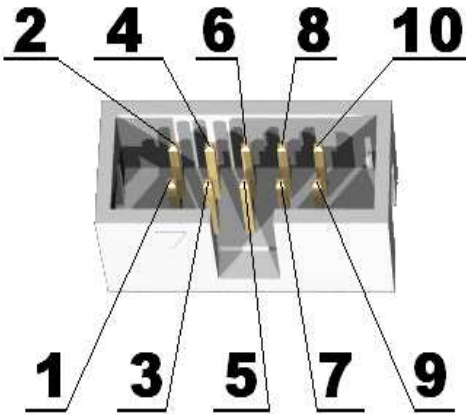
MECHANICAL DIMENSIONS
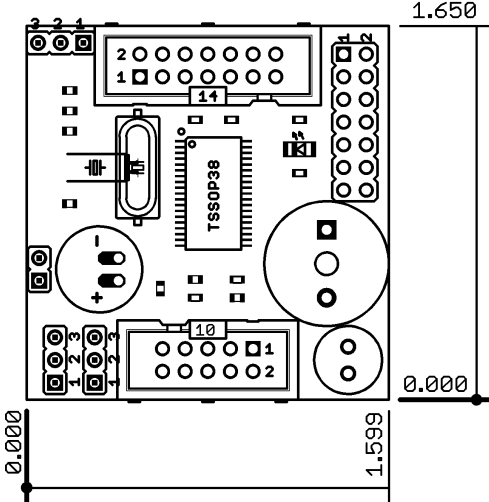
All measures are in inches.

AVAILABLE DEMO SOFTWARE

- MSP430-GBD_Blinking_Led
- MSP430-GBD_Buzzer_Beep
- MSP430-GBD_Glass_Break

ORDER CODE

MSP430-GBD – 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   November 2009