

## AVR- PX128A1 development board

## Users Manual



All boards produced by Olimex are ROHS compliant

Rev.B, May 2009

Copyright(c) 2009, OLIMEX Ltd, All rights reserved

## INTRODUCTION

**AVR-PX128A1** board is entry level development board for the new AVR XMEGA™ A Microcontroller family of devices produced by Atmel Corporation.

With AVR-PX128A1 you can explore the features of XMEGA A family on budget, the board have everything necessary to build simple applications: USB port where power is taken and power supply circuit, reset and oscillator circuits, JTAG and PDI port for programming and debugging, LCD, status LED and two user buttons.

Although very simple this board will allow you to easily build USB application like USB mass storage device, USB Audio class device, USB to Virtual RS232 port. There are plenty of GPIOs on extension headers where you can connect your additional circuits.

## BOARD FEATURES

- CPU: ATXMEGA128A1 AVR 8/16-bit XMEGA™
- JTAG connector with standard 2x5 pin layout for programming/debugging with JTAGICE mkII
- PDI connector with 2x3 pin layout for programming/debugging with JTAGICE mkII
- USB connector
- two user buttons
- RESET button
- status LED
- power supply LED
- on board voltage regulator 3.3V with up to 800mA current
- single power supply: 6V AC or 9V DC required, board can take power from USB port too
- 8 Mhz crystal oscillator
- 32768 Hz crystal and RTC
- extension header
- SD/MMC card connector
- Audio in and Audio Out jacks for microphone and headphones
- LCD 8X1
- PCB: FR-4, 1.5 mm (0,062"), red soldermask, silkscreen component print
- Dimensions: 100 x 80mm (3.9 x 3.15")

## ELECTROSTATIC WARNING

The AVR-PX128A1 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, also you will need USB A-B cable.

**Hardware:** Programmer/Debugger JTAGICE mkII

**Software:** AVR C compiler.

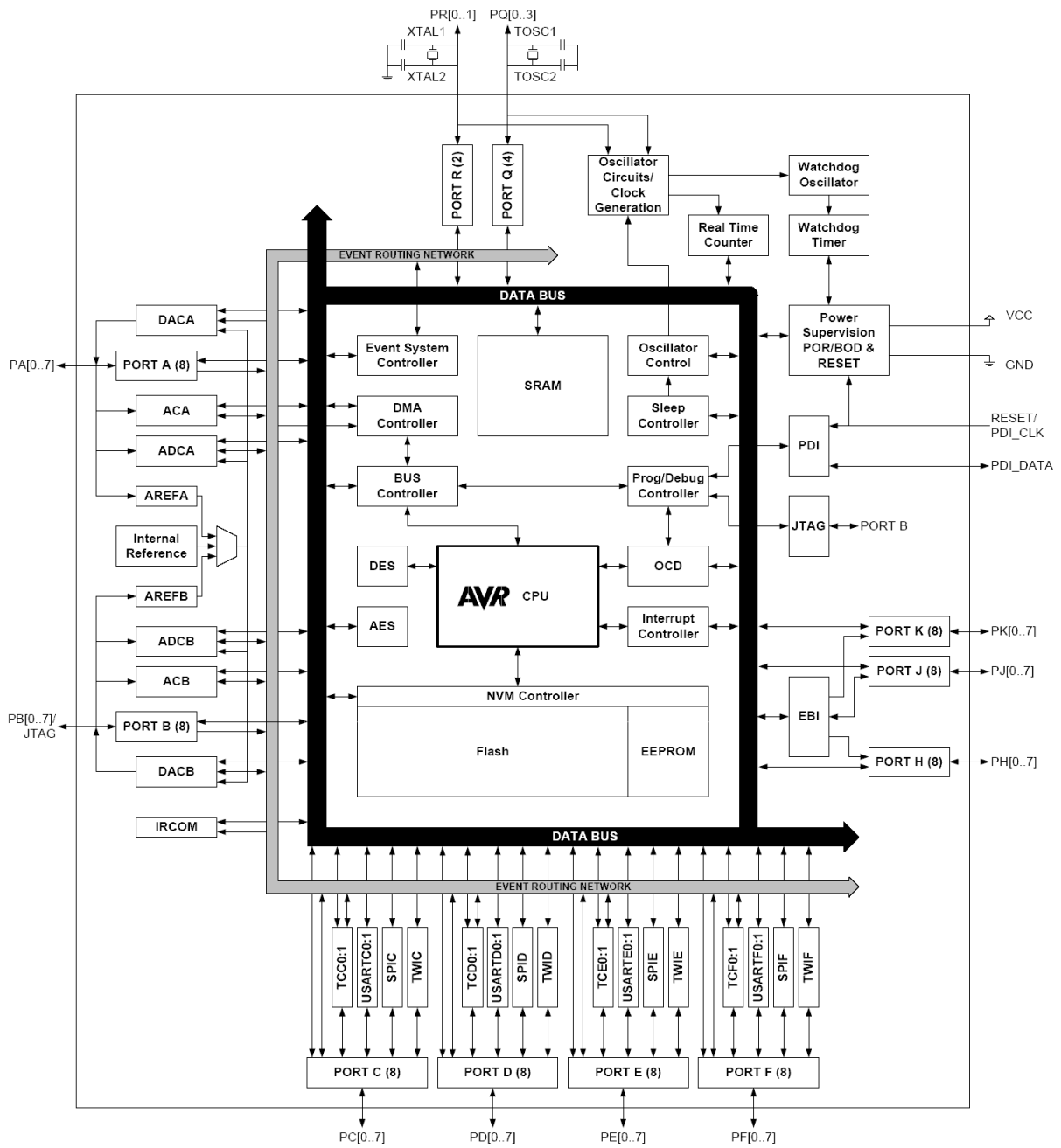
## PROCESSOR FEATURES

**AVR-PX128A1** board use High-performance, Low-power 8/16-bit AVR XMEGA Microcontroller **ATXMEGA128A1** from Atmel Corporation with these features:

- Non-Volatile Program and Data Memories:
  - 128K Bytes of In-System Self-Programmable Flash
  - 8K Bytes Boot Section with Independent Lock Bits
  - 2K Bytes EEPROM.
  - 8K Bytes Internal SRAM.
    - External Bus Interface for up to 16M bytes SRAM
    - External Bus Interface for up to 128M bit SDRAM
- Peripheral Features:
  - Four-channel DMA Controller with support for external requests
  - Eight-channel Event System
  - Eight 16-bit Timer/Counters
    - Four Timer/Counters with 4 Output Compare or Input Capture channels
    - Four Timer/Counters with 2 Output Compare or Input Capture channels
    - High-Resolution Extension on all Timer/Counters
    - Advanced Waveform Extension on two Timer/Counters
  - Eight USARTs
    - IrDA modulation/demodulation for one USART
  - Four Two-Wire Interfaces with dual address match (I<sup>2</sup>C and SMBus compatible)
  - Four SPI (Serial Peripheral Interface) peripherals
  - AES and DES Crypto Engine
  - 16-bit Real Time Counter with separate Oscillator
  - Two Eight-channel, 12-bit, 2 Msps Analog to Digital Converters
  - Two Two-channel, 12-bit, 1 Msps Digital to Analog Converters
  - Four Analog Comparators with Window compare function

- External Interrupts on all General Purpose I/O pins
- Programmable Watchdog Timer with Separate On-chip Ultra Low Power Oscillator
- Special Microcontroller Features
  - Power-on Reset and Programmable Brown-out Detection
  - Internal and External Clock Options with PLL and Prescaler
  - Programmable Multi-level Interrupt Controller
  - Sleep Modes: Idle, Power-down, Standby, Power-save, Extended Standby
  - Advanced Programming, Test and Debugging Interfaces
    - JTAG (IEEE 1149.1 Compliant) Interface for programming, test and debugging
    - PDI (Program and Debug Interface) for programming and debugging
- I/O
  - 78 Programmable I/O Lines
- Operating Voltage
  - 1.6 - 3.6V
- Speed performance
  - 0 - 12 MHz @ 1.6 - 3.6V
  - 0 - 32 MHz @ 2.7 - 3.6V

# BLOCK DIAGRAM

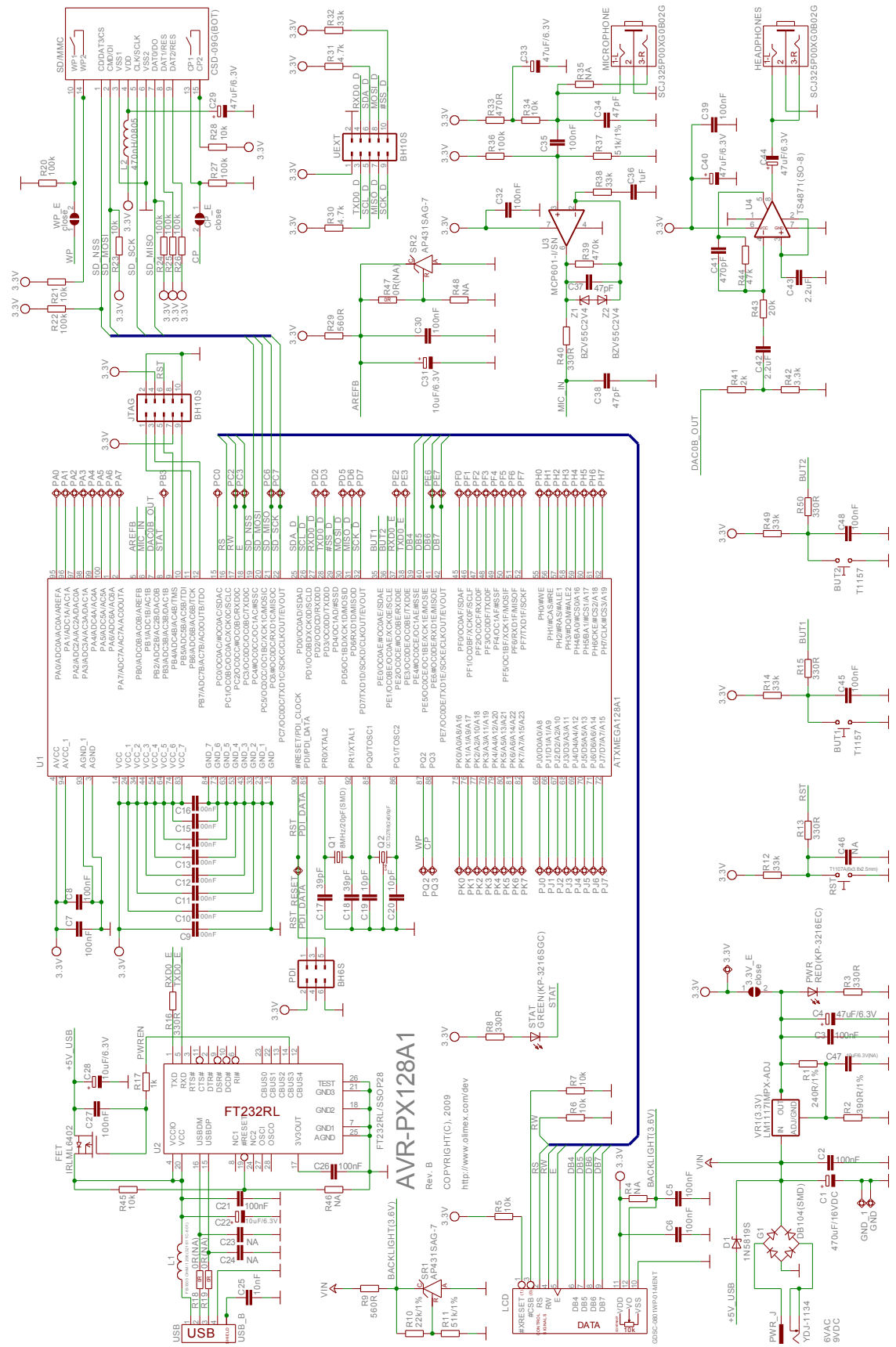


# MEMORY MAP

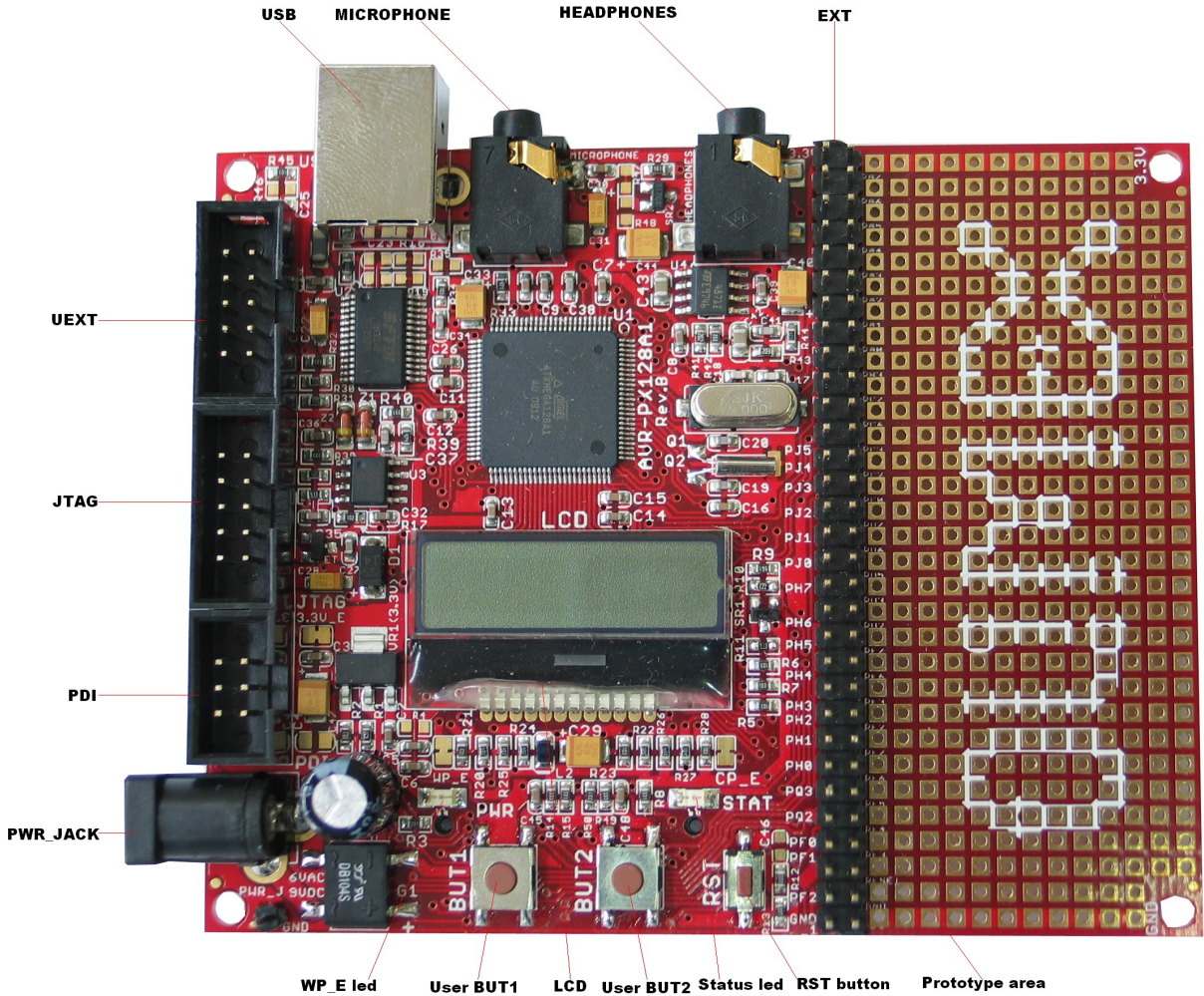
## ATxmega128A1

0	I/O Registers (4KB)
FFF	
1000	EEPROM (2K)
17FF	
	RESERVED
2000	Internal SRAM (8K)
3FFF	
4000	External Memory (0 to 16 MB)
FFFFFF	

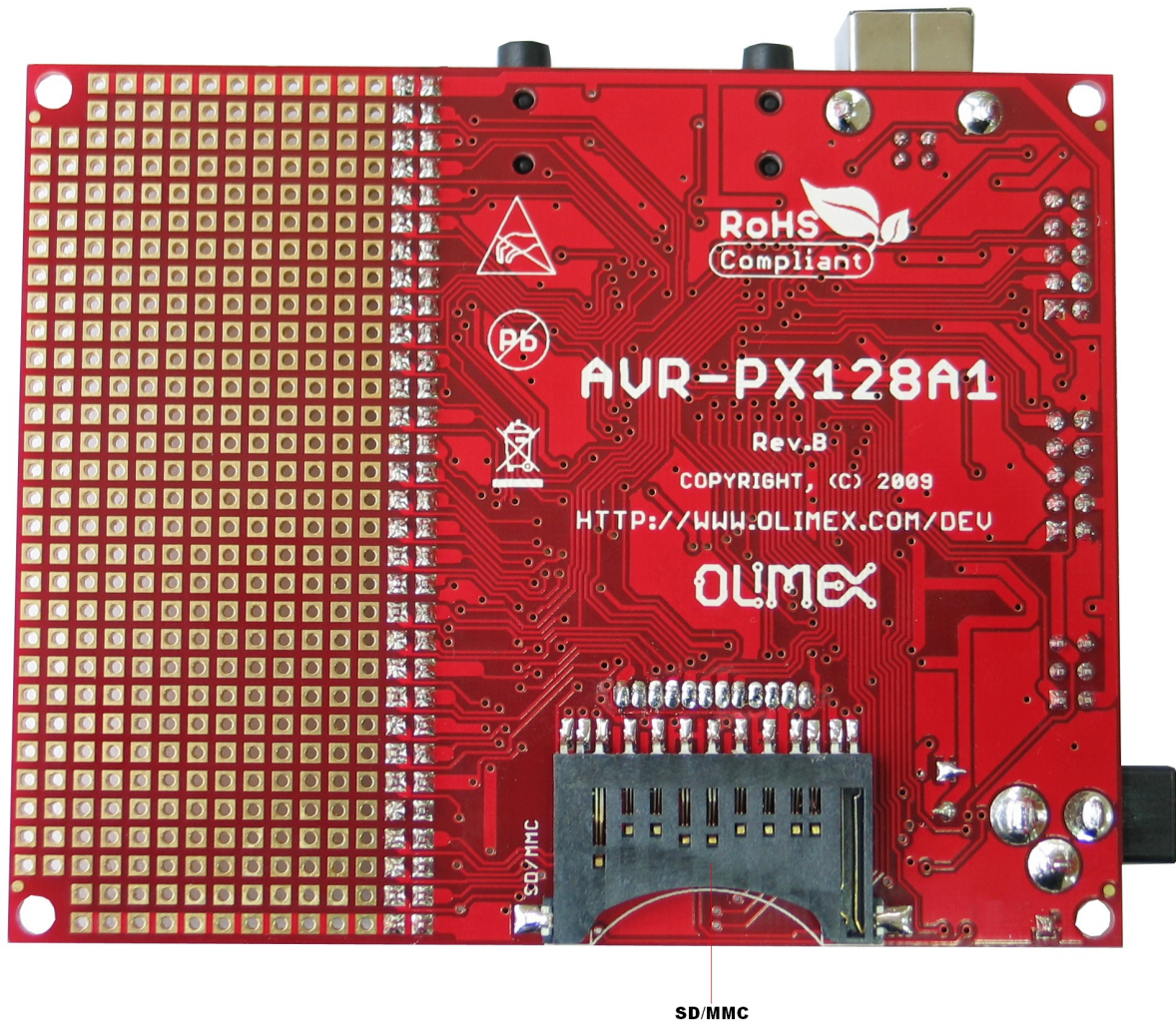
# SCHEMATIC



# BOARD LAYOUT







## POWER SUPPLY CIRCUIT

AVR-PX128A1 is typically power supplied with 9 V DC, and 6 V AC.

The board power consumption is about 30mA.

## RESET CIRCUIT

AVR-PX128A1 reset circuit includes pin 5 of PDI connector, pin 6 of JTAG connector, ATXMEGA128A1 pin 90 and Reset button.

## CLOCK CIRCUIT

Quartz crystal 8MHz is connected to ATXMEGA128A1 pin 91 (PR0/XTAL2) and pin 92 (PR1/XTAL1).

## JUMPER DESCRIPTION

### 3.3V\_E



Enable the main 3.3 V regulator VR1(3.3V) - LM1117.

Default state is closed.

### WP\_E



Enable SD/MMC Write Protect signal check.

Default state is closed.

### CP\_E



Enable SD/MMC Card Present signal check.

Default state is closed.

## INPUT/OUTPUT

**Status LED (green)** with name **STAT** connected to ATXMEGA128A1 pin 8 (PB3/ADC3B/AC3B/DAC1B) and EXT pin PB3.

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

**User button** with name **BUT1** connected to ATXMEGA128A1 pin 35 (PE0/OC0AE/#OC0AE/SDAE).

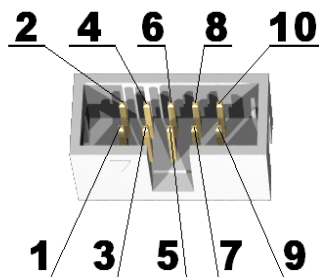
**User button** with name **BUT2** connected to ATXMEGA128A1 pin 36 (PE1/OC0BE/#XCK0E/SCLE).

**Reset button** with name **RST** connected to pin 5 of PDI connector, pin 6 of JTAG connector, ATXMEGA128A1 pin 90 (#RESET/PDI\_CLOCK).

## CONNECTOR DESCRIPTIONS

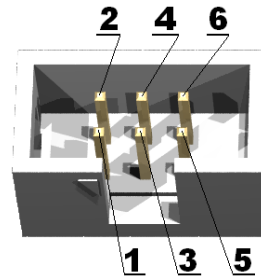
### JTAG

Pin #	Signal Name
1	PB6
2	GND
3	PB7
4	3.3V
5	PB4
6	RST
7	3.3V
8	NC
9	PB5
10	GND



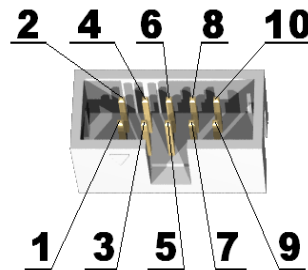
## PDI

Pin #	Signal Name
1	PDI_DATA
2	3.3V
3	NC
4	NC
5	RST
6	GND



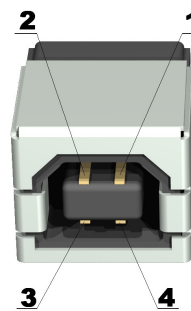
## UEXT

Pin #	Signal Name
1	3.3V
2	GND
3	TXD0_D
4	RXD0_D
5	SCL_D
6	SDA_D
7	MISO_D
8	MOSI_D
9	SCK_D
10	#SS_D

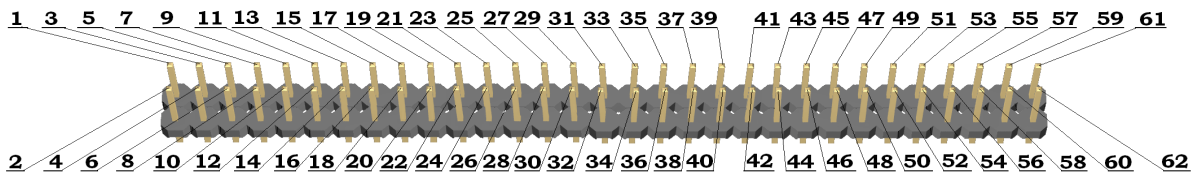


## USB

Pin #	Signal Name
1	+5V_USB
2	USBDM
3	USBDP
4	GND



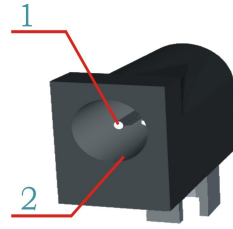
## EXT



Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	PA7	4	PK7
5	PA6	6	PK6
7	PA5	8	PK5
9	PA4	10	PK4
11	PA3	12	PK3
13	PA2	14	PK2
15	PA1	16	PK1
17	PA0	18	PK0
19	PB3 (STAT)	20	PJ7
21	PC7 (SD_SCK)	22	PJ6
23	PC6 (SD_MISO)	24	PJ5
25	PC3 (E)	26	PJ4
27	PC2 (RW)	28	PJ3
29	PC0	30	PJ2
31	PD7 (SCK_D)	32	PJ1
33	PD6 (MISO_D)	34	PJ0
35	PD5 (MOSI_D)	36	PH7
37	PD3 (TXD0_D)	38	PH6
39	PD2 (RXD0_D)	40	PH5
41	PE7 (DB7)	42	PH4
43	PE6 (DB6)	44	PH3
45	PE3 (TXD0_E)	46	PH2
47	PE2 (RXD0_E)	48	PH1
49	PF7	50	PH0
51	PF6	52	PQ3 (CP)
53	PF5	54	PQ2 (WP)
55	PF4	56	PF0
57	PF3	58	PF1
59	RST	60	PF2
61	GND	62	GND

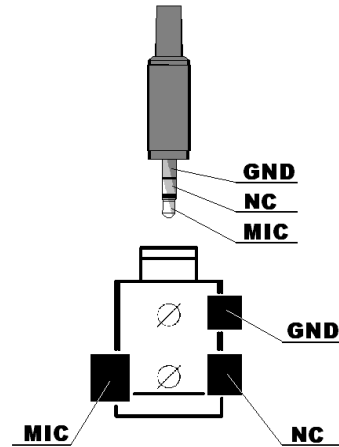
## PWR JACK

Pin #	Signal Name
1	Power Input
2	GND



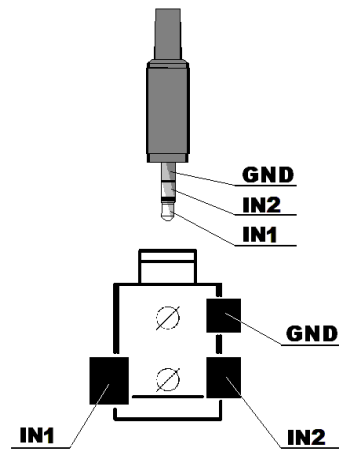
## MICROPHONE

Pin #	Signal Name
1	AGND
2	NC
3	MIC

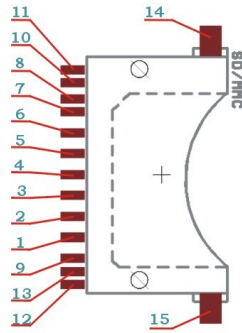


## HEADPHONE

Pin #	Signal Name
1	AGND
2	IN1=IN2
3	IN2=IN1

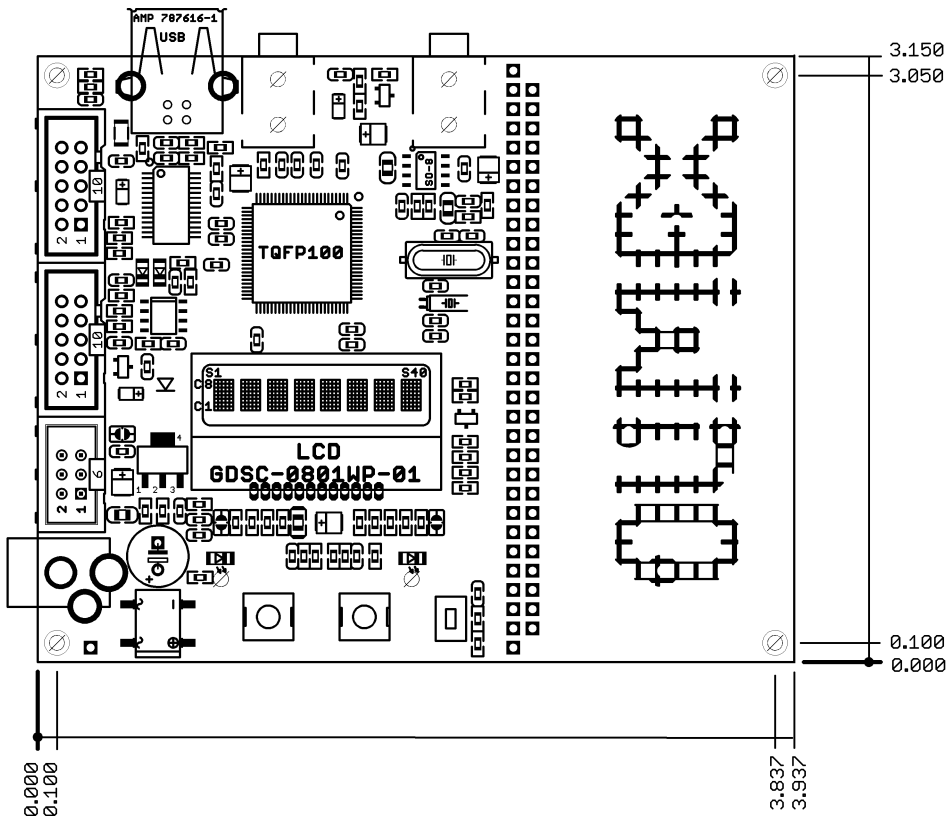


# SD/MMC



Pin #	Signal Name	Pin #	Signal Name
1	SD_NSS	2	SD_MOSI
3	GND	4	3.3V
5	SD_SCK	6	GND
7	SD_MISO	8	Via 100k to 3.3V
9	Via 100k to 3.3V	10	WP
11	NC	12	NC
13	CP	14	Via 10k to 3.3V
15	Via 10k to 3.3V		

## MECHANICAL DIMENSIONS



All measures are in inches.

## **AVAILABLE DEMO SOFTWARE**

- Accessing the XMEGA EEPROM
- Getting Started With the XMEGA Event System
- Use and configuration of IR communication module
- Using the XMEGA ADC
- Using the XMEGA Analog Comparator
- Using the XMEGA Clock System
- Using the XMEGA DAC
- Using the XMEGA DMA Controller
- Using the XMEGA External Bus Interface
- Using the XMEGA IO Pins and External Interrupts
- Using the XMEGA Real Time Counter
- Using the XMEGA Timer\_Counter
- Using the XMEGA Timer\_Counter Extensions
- Using the XMEGA USART
- XMEGA Interrupts and the Programmable Multi-level Interrupt Controller



## **ORDER CODE**

**AVR-PX128A1** - 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](http://www.olimex.com/dev) for more info.

### **Revision history:**

REV.B                    - create   May 2009

**Disclaimer:**

© 2009 Olimex Ltd. All rights reserved. Olimex®, logo and combinations thereof, are registered trademarks of Olimex Ltd. Other terms and product names may be trademarks of others.

The information in this document is provided in connection with Olimex products. No license, express or implied or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Olimex products.

Neither the whole nor any part of the information contained in or the product described in this document may be adapted or reproduced in any material from except with the prior written permission of the copyright holder.

The product described in this document is subject to continuous development and improvements. All particulars of the product and its use contained in this document are given by OLIMEX in good faith. However all warranties implied or expressed including but not limited to implied warranties of merchantability or fitness for purpose are excluded.

This document is intended only to assist the reader in the use of the product. OLIMEX Ltd. shall not be liable for any loss or damage arising from the use of any information in this document or any error or omission in such information or any incorrect use of the product.