Atmel AT88Microbase Board
Hardware User Guide

Features

- Atmel AT90USB1287 (Atmel AVR) 64 QFN device
  - 128K Bytes of in-system programmable flash
  - 4K Bytes EEPROM
  - 8K Bytes internal SRAM
- Atmel AT88SC108 CryptoCompanion IC
- Supports the Atmel ATSHA204 CryptoAuthentication IC
- Serial interfaces
  - USB (Full and Low Speeds)
  - I^{2}C
  - UART
  - SPI
- Power LED
- Three user definable LEDs
- RESET button
- HWB button
  - Force the Atmel AVR into DFU mode at reset
  - General purpose input switch
- 16MHz system clock

Contents

- Atmel AT88CKMicrobase
- 6" USB cable
- Top module kit listed in Table 1-1

1. Introduction

Atmel® AT88Microbase serves as a base module for the following crypto kits.

Table 1-1. Atmel Crypto kits

Atmel Crypto kits				
Atmel kits	Supported Atmel device	Device footprint	Communication protocol	Socket(s)
AT88CK201STK	CryptoRF	—	SWI/I^{2}C	—
AT88CK101STK3	ATSHA204	SOT23-3	SWI	1
AT88CK101STK8	ATSHA204	8LD SOIC	SWI/I^{2}C	1
AT88CK109STK3	ATSHA204	SOT23-3	SWI	2
AT88CK109STK8	ATSHA204	8LD SOIC	SWI/I^{2}C	2

The AT88Microbase uses a convenient Type-A USB interface allowing users to interface with a personal computer and experiment with Crypto kits. The small USB form factor of the AT88Microbase allows the board to function as a demo as well as a development platform.

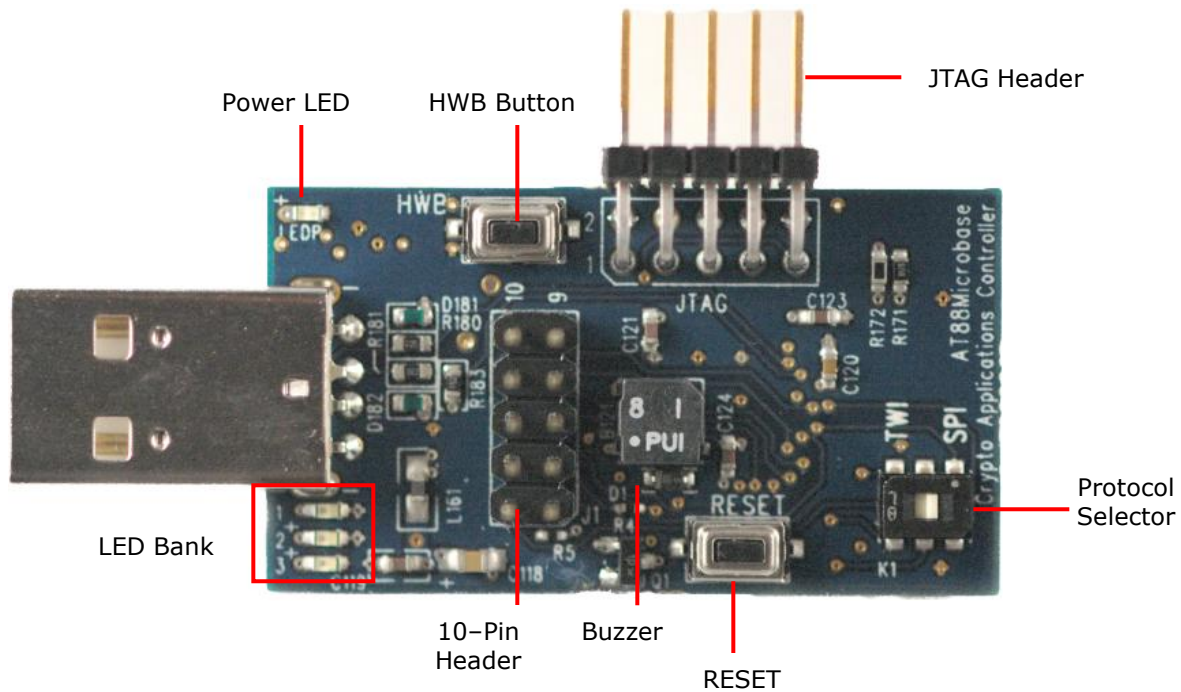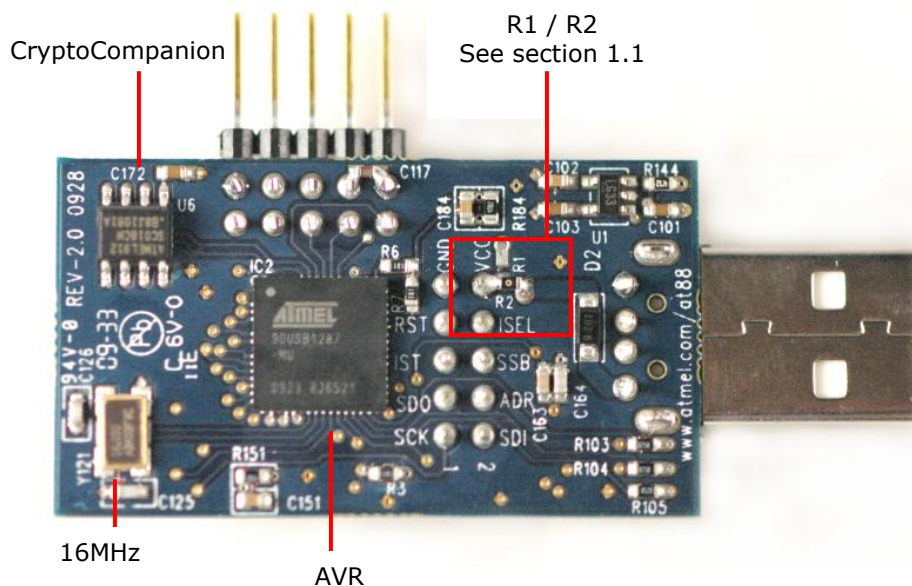Figure 1-1. Atmel AT88Microbase top side components

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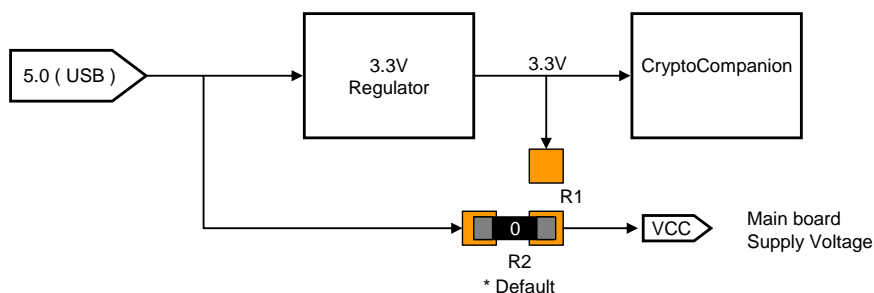Figure 1-2. Atmel AT88Microbase bottom side components

1.1. USB Powered

The on-board power supply circuitry allows two possible configurations for the main supply voltage.

Table 1-1. On-board power supply circuitry

Mounted Resistor	Main Board Supply Voltage	Comments
R1	3.3V	
R2	5.0V (USB)	Default Setting

Figure 1-3. On-board power supply circuitry

The Atmel CryptoCompanion™ supply voltage is always 3.3V, regardless of R1 and R2 configuration.

Note: To operate the Atmel AT88Microbase below 4.5V, the 16MHz crystal must be replaced with an 8MHz crystal. The **ABM3B-8.000MHZ-B2-T** 8MHz crystal is a drop-in replacement.

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1.2. Power LED (LEDP)

The blue LED (LEDP) is always lit when power is applied to the board regardless of the voltage configuration. See section 1.3.
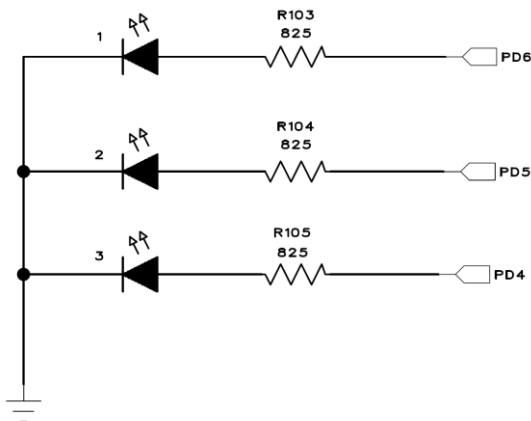
Figure 1-4.   Power on LED "LEDP"
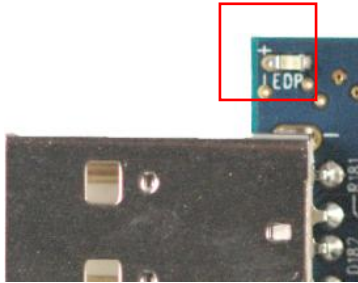
1.3. Description of LED bank

The AT88Microbase includes three general purpose red LEDs, which are connected to PD6, PD5, and PD4. To light a LED, the corresponding port pin must be driven high. To turn off a LED, the corresponding port pin must be driven low.

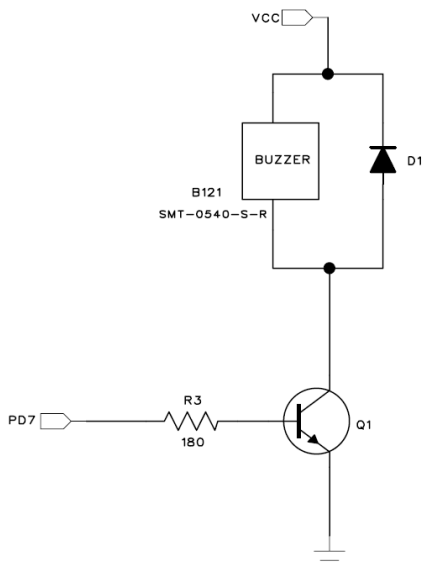Figure 1-5.   LEDs implementation schematic

Note: The Atmel AVR can source or sink enough current to drive an LED directly

1.4. Buzzer

The small onboard buzzer adds audio capability to the AT88Microbase board. The buzzer requires that PD7 be driven with a square wave at 4.0 ± 0.5KHz to achieve a maximum decibel of 78dB.

Figure 1-6.   Buzzer implementation schematic

Brief Spec:

Input signal	Square wave
Resonant frequency	4.0 ± 0.5KHz
Sound pressure level	78dB

1.5. General purpose switch

The AT88Microbase also includes one general purpose input switch, HWB. The HWB pushbutton switch actually has dual functionality. Its primary function is to force the Atmel AVR® into DFU mode at reset. See section 1.6.2.1 for more details. Its secondary function is a general purpose input switch that is connected to PA2.

Figure 1-7.   HWB schematic implementation
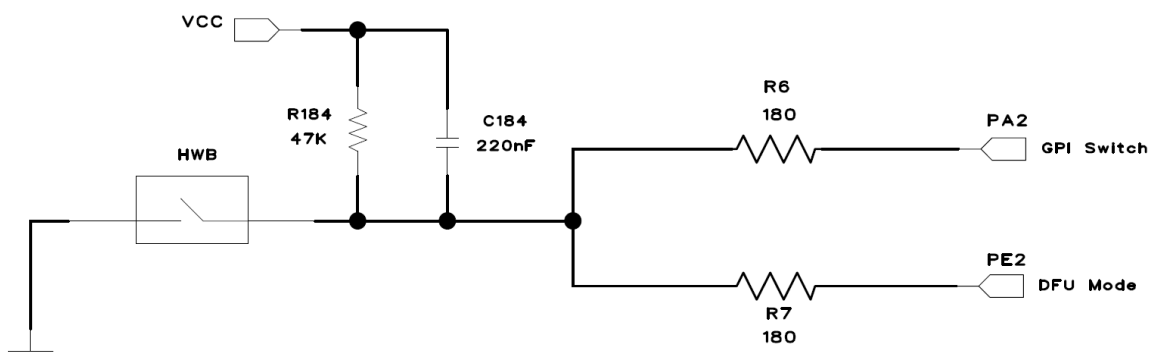
1.6. Description of interface header

The 10-Pin header (J1) of the AT88Microbase provides interfacing for daughter boards.
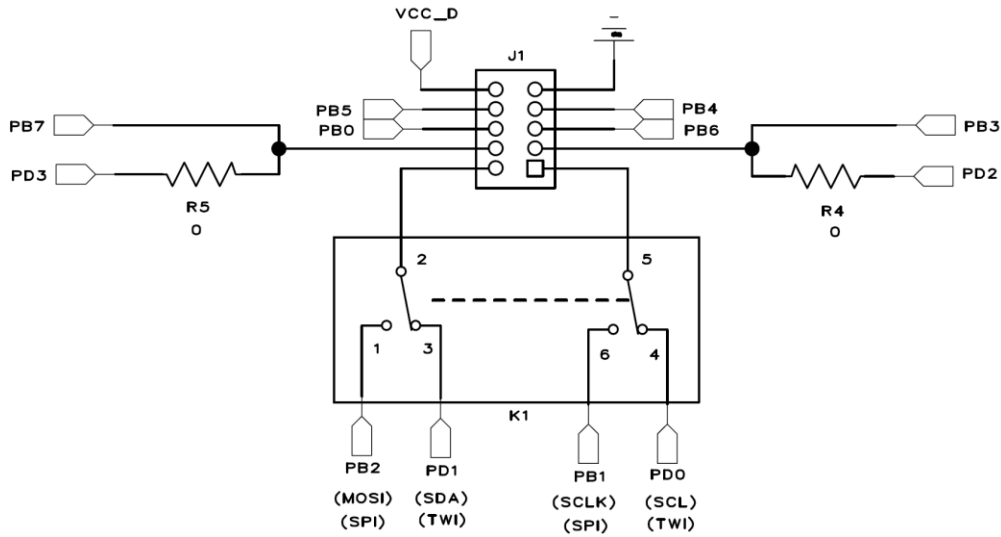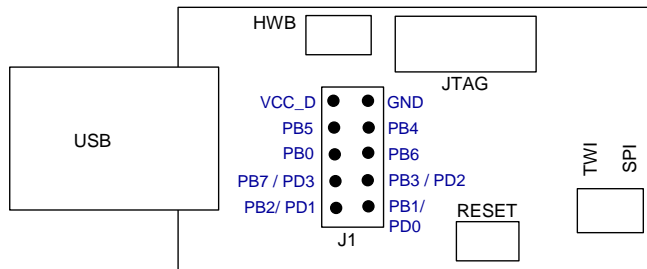
Figure 1-8. 10-pin interface header

Figure 1-9. 10-pin interface header (J1) orientation

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1.6.1. The Atmel CryptoCompanion chip

The AT88Microbase has one CryptoCompanion device (Atmel AT88SC018), which is located on the back side of board. The AT88SC018 is designed as the mate to the Atmel CryptoRF® (CRF) and the Atmel CryptoMemory® (CM) chips. The SCL and SDA pins are connected to PD0 and PD1, respectively. The RST and PDN pins are connected to PF2 and PF3, respectively.

Figure 1-10. The Atmel CryptoCompanion implementation schematic
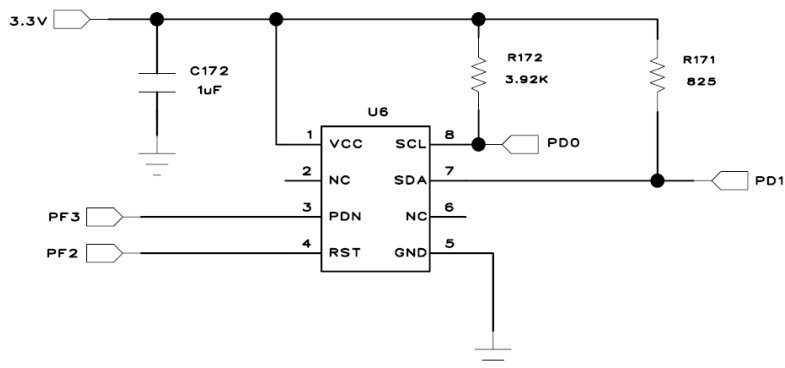
The datasheet can be found on the Atmel web site, http://www.atmel.com/products/securemem.

Note: The Atmel CryptoCompanion chip cannot be used with the Atmel CryptoAuthentication™ family of devices.

1.6.2. In-system programming

1.6.2.1. Programming with USB bootloader: DFU (Device firmware upgrade)

The Atmel AT90USB1287 AVR comes with a default factory pre-programmed USB bootloader located in the on-chip boot section of the AT90USB1287. This is the easiest and fastest way to reprogram the device directly over the USB interface. The "Flip" PC side application, available for free on the Atmel website, offers a flexible and user friendly interface for reprogramming the application over the USB bus.

The "HWB" push button is used to place the AVR into DFU mode after reset (Refer to the Atmel AT90USB1287 datasheet section, "boot loader support.")

The following steps enable the DFU mode:

1. Press and hold "HWB" button

2. Press the "RESET" button

3. Release the "RESET" button

4. Release the "HWB" button

For more information about the USB bootloader and FLIP software, please refer to the "USB Bootloader" datasheet document and the, "FLIP User Manual."

Note: HWBE fuse must be enabled to support DFU

1.6.2.2. Programming with the Atmel AVR JTAG ICE

The AT90USB1287 can be programmed using the specific JTAG link. This subsection will explain how to connect and use the Atmel AVR JTAG ICE.

Note: When the JTAGEN fuse is disabled, the four TAP pins are normal port pins, and the TAP controller is in reset. When the JTAGEN fuse is enabled, the input TAP signals are internally pulled high. This enables the JTAG for boundary-scan and programming. The Atmel AT90USB1287 device is shipped with this fuse programmed.

Figure 1-11. Connecting the Atmel AVR JTAGICE mkII to the Atmel AT88Microbase

The Flash, EEPROM, and all fuse and lock bit options ISP-programmable, can be programmed individually or with the sequential automatic programming option.

Note: See the Atmel AVR Studio® on-line help for information.

1.6.2.3. Program debugging with the Atmel AVR JTAGICS mkII

Connect the JTAG ICE mkII as shown in Figure 1-11, for debugging help. Please refer to AVR Studio help information.

When using JTAG ICE MK II for debugging, and as AT90USB1287 parts are factory configured with the higher security level set, a chip erase operation will be performed on the part before debugging. Thus the on-chip flash bootloader will be erased. It can be restored after the debug session using the bootloader hex file available from the Amel website.

2. References and further information

Schematics, gerber files, bill of materials (BOM), development and demonstration software are conveniently downloadable from the Atmel website at www.atmel.com/cryptokits.

3. EVALUATION BOARD/KIT IMPORTANT NOTICE

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