

AVR370: MEGA-1284P Xplained Getting Started Guide



Features

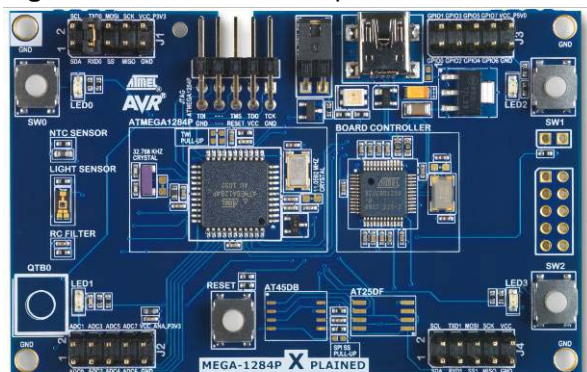
- Easy to reprogram with just a USB cable and a preprogrammed bootloader
- Easy to debug code with JTAG based debugger/emulator

1 Introduction

The Atmel® MEGA-1284P Xplained evaluation kit is a hardware platform to evaluate the [Atmel ATmega1284P](#) microcontroller.

The kit offers a range of features that enables the [Atmel megaAVR®](#) user to get started using [megaAVR](#) peripherals right away and understand how to integrate the [megaAVR](#) device in their own design. This getting started guide will take you through all the basic steps needed to start using the MEGA-1284P Xplained evaluation kit.

Figure 1-1. MEGA-1284P Xplained evaluation kit.



8-bit **AVR®**
Microcontrollers

Application Note

Rev. 8374A-AVR-04/11





2 What is needed to get started

To be able to run the preprogrammed code, you need the Atmel MEGA-1284P Xplained evaluation kit and a USB cable (standard A to mini-B or mini AB) to connect the board to a PC.

To modify the example code or write new code and compile it, you need a toolchain for the Atmel AVR[®] microcontrollers and an IDE to edit and debug code. Atmel provides both the [AVR Studio[®] 4](#) and the AVR GNU toolchain. Other IDEs and toolchains are also available like the IAR Embedded Workbench[®].

If you, in addition, want to debug the code at runtime, you'll need a debugger like the [Atmel AVR JTAGICE mkII](#) or the [Atmel AVR ONE!](#) More information on these tools is available at the Atmel webpage. See the reference section later in this document for more details.

2.1 Documentation for MEGA-1284P Xplained

The "AVR364 MEGA-1284P Xplained Hardware User's Guide" package includes all in-depth information about the kit like schematics, BOM, assembly drawings, 3D plots and more. The package is available from the Atmel web-site.

www.atmel.com/xplained

2.2 AVR Studio 4

The [AVR Studio 4](#) is a free IDE for the Atmel 8-bit AVR microcontrollers. It can be used to write code, program, and debug a microcontroller.

AVR Studio 4 www.atmel.com/avrstudio

2.3 Bootloader programming tools

2.3.1 AVR open source programmer (AVROSP)

The AVR Open Source Programmer (AVROSP) is an AVR programmer application that offers the possibility to program the [Atmel megaAVR](#) devices via a bootloader. It is a command-line tool, using the same syntax as the [Atmel STK[®]500](#) and the [Atmel AVR JTAGICE](#) command-line tools in the [Atmel AVR Studio](#).

AVR911: AVR Open Source Programmer

http://www.atmel.com/dyn/resources/prod_documents/doc2568.pdf

http://www.atmel.com/dyn/resources/prod_documents/AVR911.zip

On the MEGA-1284P Xplained board the [Atmel ATmega1284P](#) microcontroller is preprogrammed with a bootloader firmware that is compatible to the AVROSP.

2.3.2 FLIP (BatchISP)

BatchISP is a command line tool for programming the flash and the EEPROM memories of the board controller, and is part of the FLIP installation. It can be used to communicate with the preprogrammed DFU bootloader on the board controller.

FLIP (FLexible In-system Programmer) for programming

http://atmel.com/dyn/products/tools_card.asp?tool_id=3886

2.4 Toolchain

In order to build an application from the source code a toolchain is needed, which includes the required tools like assembler, compiler, and linker. The code for this kit is compatible with the AVR GNU and IAR™ AVR toolchains.

2.4.1 AVR GNU toolchain

The AVR GNU toolchain is a free toolchain that can be downloaded from the Atmel webpage. It includes all necessary tools like a C/C++ compiler, assembler and linker, which are necessary for the AVR application development. The toolchain integrates with the [Atmel AVR Studio 4](#) through the AVR GCC plug-in.

AVR GNU toolchain (free C/C++ compiler for 8-bit and 32-bit AVR^s)

http://www.atmel.com/dyn/products/tools_card.asp?tool_id=4118

2.4.2 IAR AVR toolchain

The IAR AVR toolchain is a commercial toolchain which includes all necessary tools like C/C++ compiler, assembler and linker which are needed for the AVR application development. There is a 30 day evaluation version as well as a 4k (code size limited) kick-start version available from their website.

IAR Embedded Workbench for the Atmel AVR

<http://www.iar.com/website1/1.0.1.0/107/1/>

2.5 Programmers and debuggers

Programmers and debuggers are needed when either the application should be programmed without using the bootloader, or when debugging support is needed. Several different tools are available that can be used directly with the Xplained kit; the most common of these are described in the next chapters.

2.5.1 Atmel AVR Dragon

The AVR Dragon™ is a low-cost debug/programming tool that can be used for code development with the Atmel MEGA-1284P Xplained kit.

Atmel AVR Dragon (on-chip programming and debugging tool)

http://atmel.com/dyn/products/tools_card.asp?tool_id=3891

2.5.2 Atmel AVR JTAGICE mkII

The AVR JTAGICE mkII is a mid-range debug/programming tool that can be used for code development with the MEGA-1284P Xplained kit.

Atmel AVR JTAGICE mkII (on-chip programming and debugging tool)

http://www.atmel.com/dyn/products/tools_card.asp?tool_id=3353

2.5.3 Atmel AVR ONE!

The AVR ONE! is a high-end debug/programming tool that can be used for code development with the MEGA-1284P Xplained kit.

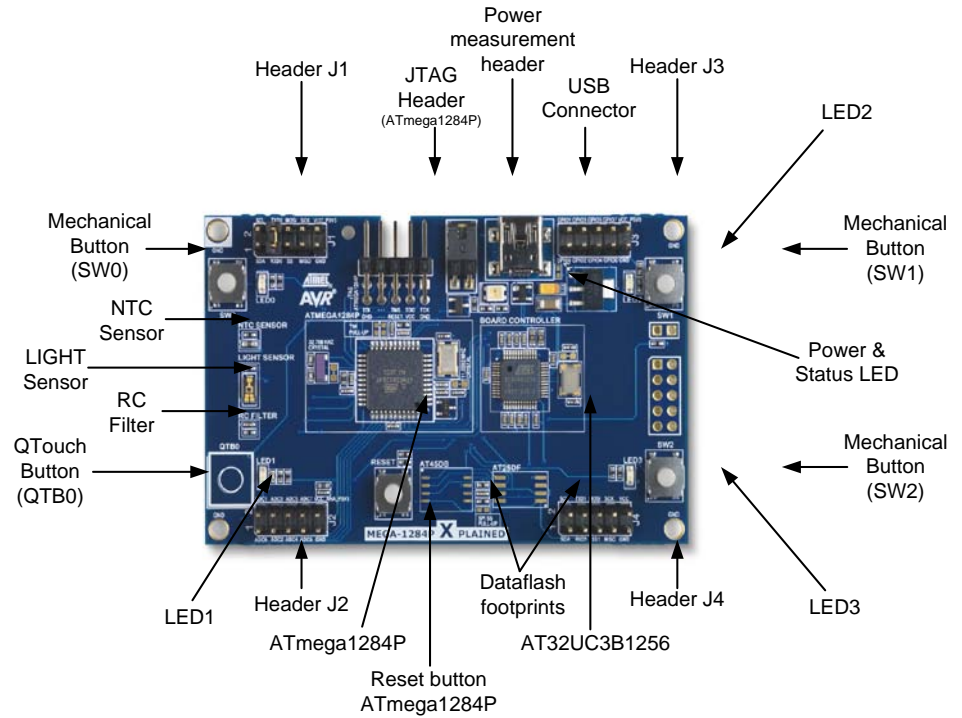
Atmel AVR ONE! (on-chip programming and debugging tool)

http://www.atmel.com/dyn/products/tools_card.asp?tool_id=4279

3 Board overview

Figure 3-1 shows most of the available features on the board. For more detailed information on the Atmel MEGA-1284P Xplained hardware, take a look at the Atmel application note “AVR364: MEGA-1284P Xplained Hardware User’s Guide”.

Figure 3-1. Overview of the MEGA-1284P Xplained kit.



4 Connecting the board

Connect a USB cable between the board and a PC or a USB power supply to power it up. This is all that is needed. When power is applied the power/status LED will light up in green.

WARNING

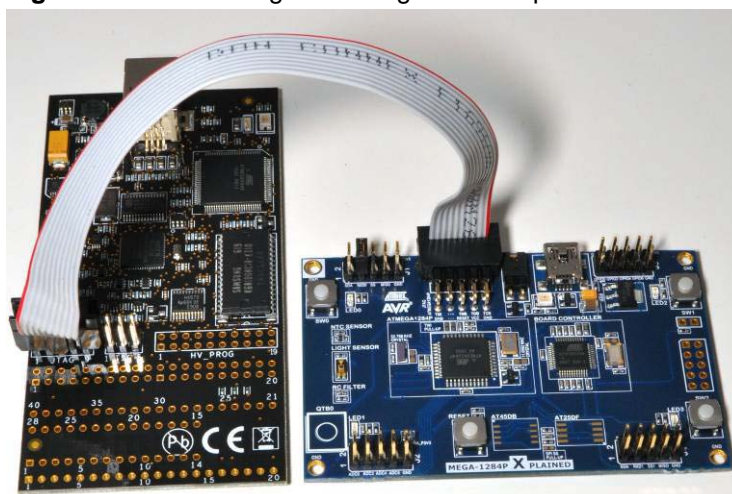
Do not power the board without having the jumper next to the USB connector or an ammeter mounted. Otherwise, the device may be damaged.

When connecting the Atmel MEGA-1284P Xplained to a PC, the operating system will request a driver file for installing the serial communication driver. This driver file is available in the zip-file associated with this document. The driver file supports both 32-bit and 64-bit versions of Windows® XP and Windows 7. Driver installs are not necessary on Linux® operating systems.

4.1 Connecting the Atmel AVR Dragon

In order to connect the [AVR Dragon](#) to the MEGA-1284P Xplained, a 10-pin header cable is needed. Connect the cable between the JTAG connector on the AVR Dragon kit and the MEGA-1284P Xplained JTAG connector. Take a look at [Figure 4-1](#) how the connection should be done.

Figure 4-1. Connecting AVR Dragon to an Xplained board.



4.2 Connecting the Atmel AVR JTAGICE mkII

The grey connector on the [AVR JTAGICE mkII](#) probe has to be used when connecting to the Atmel MEGA-1284P Xplained. See [Figure 4-2](#) for reference of how to make the connection.

Figure 4-2. Connecting AVR JTAGICE mkII to an Xplained board.



4.3 Connecting of the Atmel AVR ONE!

The [AVR ONE!](#) JTAG connector can be connected to the MEGA-1284P Xplained kit with a standoff adapter as shown in [Figure 4-3](#).

Figure 4-3. Connecting AVR ONE! to a Xplained board.



5 Programming the kit

5.1 Programming via the bootloader

The preprogrammed bootloader on the [Atmel ATmega1284P](#) offers the possibility to program the device via the UART interface. Since the default firmware of the board controller acts as UART to USB bridge the [ATmega1284P](#) can be programmed from the PC via the USB connection to the kit.

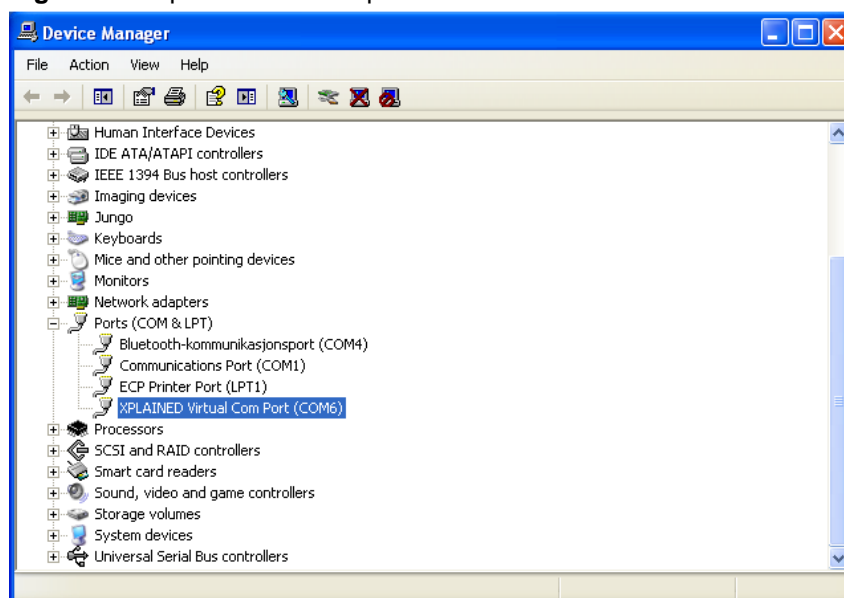
The bootloader on the [ATmega1284P](#) is evoked by pushing the mechanical switch (SW0) during reset. Programming can be performed by using the command line tool from the AVROSP package. More information about AVROSP can be found in the application note that is available for this package. The executable file `avrosp.exe` is the only file required to use AVROSP. It is contained in the `avr911.zip` file that comes with this application note. The zip-file also contains the complete source code and a copy of the part description files from an [Atmel AVR Studio 4](#) installation.

5.1.1 Step-by-step guide

To program the device, follow these steps:

1. Connect the USB cable from the PC to the kit
2. Press the reset button and the SW0 button
3. Release the reset button while still pressing the SW0 button
4. Release the SW0 button
5. Open the device manager and locate the COM port used by the kit, it should be listed as "XPLAINED Virtual Com Port" as shown in [Figure 5-1](#)

Figure 5-1. Xplained kit COM port.



6. The communication port settings (baud rate, parity control etc.) must be set manually before using AVROSP. The needed settings are 57600bps, no parity control and eight data bits. Therefore the following command must be executed on the DOS command interpreter assuming the kit is listed under COM6, as shown in [Figure 5-1](#): ***mode com6 baud=57600 parity=n data=8***



7. Now the AVROSP application can be started to program the kit with the application. Following command can be used assuming that the kit uses COM6:
avrosp -dATmega128 -cCOM6 -pf -vf - ifmega_1284p_xplained_example.hex -e
8. Your firmware should now be running

NOTE

AVROSP only supports comports COM1 through COM8. Connecting to a higher comport than this will not work.

5.2 Restoring the bootloader

When the bootloader has been erased it can be restored with any of the previously mentioned programming tools.

The hex file for the bootloader is a part of the application note zip (in the folder named hex) file and is called *mega_1284p_xplained_bootloader_and_example.hex*

6 Example applications

6.1 Preprogrammed firmware

The preprogrammed firmware in the [Atmel ATmega1284P](#) is set up with an example code that demonstrates some of the basic features of the MEGA-1284P Xplained kit. This includes sleep modes, reading the light sensor and the ntc sensor. The example application has two main modes, demo mode or terminal mode. For more information please refer to the doxygen documentation (readme.html) found in the zip file associated with this application note. It also includes a bootloader (AVROSP) which allows the user to re-program the [ATmega1284P](#) without using an external programmer.

The [Atmel AT32UC3B1256](#) board controller is also pre-programmed with a bootloader and an USART-to-USB gateway application which can be used to communicate with the target controller [ATmega1284P](#).



7 How to compile example projects

7.1 Atmel AVR Studio 4

Open the [AVR Studio 4](#) project and compile the project. The compiler will generate an Intel hex file and an ELF file. The Intel hex file can be downloaded to the [Atmel ATmega1284P](#) via the AVROSP program.

7.2 IAR Embedded Workbench

Open the IAR Embedded Workbench project and compile the code. After compilation an Intel hex and a debug file will be available. The Intel hex file can be downloaded to the [ATmega1284P](#) via the AVROSP program.

8 EVALUATION BOARD/KIT IMPORTANT NOTICE

This evaluation board/kit is intended for use for **FURTHER ENGINEERING, DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY**. It is not a finished product and may not (yet) comply with some or any technical or legal requirements that are applicable to finished products, including, without limitation, directives regarding electromagnetic compatibility, recycling (WEEE), FCC, CE or UL (except as may be otherwise noted on the board/kit). Atmel supplied this board/kit "AS IS," without any warranties, with all faults, at the buyer's and further users' sole risk. The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies Atmel from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge and any other technical or legal concerns.

EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER USER NOR ATMEL SHALL BE LIABLE TO EACH OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

No license is granted under any patent right or other intellectual property right of Atmel covering or relating to any machine, process, or combination in which such Atmel products or services might be or are used.

Mailing Address: Atmel Corporation, 2325 Orchard Parkway, San Jose, CA 95131

Copyright © 2011, Atmel Corporation





9 Table of contents

Features.....	1
1 Introduction.....	1
2 What is needed to get started.....	2
2.1 Documentation for MEGA-1284P Xplained.....	2
2.2 AVR Studio 4.....	2
2.3 Bootloader programming tools.....	2
2.3.1 AVR open source programmer (AVROSP).....	2
2.3.2 FLIP (BatchISP).....	2
2.4 Toolchain.....	3
2.4.1 AVR GNU toolchain.....	3
2.4.2 IAR AVR toolchain.....	3
2.5 Programmers and debuggers.....	3
2.5.1 Atmel AVR Dragon.....	3
2.5.2 Atmel AVR JTAGICE mkII.....	3
2.5.3 Atmel AVR ONE!.....	3
3 Board overview.....	4
4 Connecting the board.....	5
4.1 Connecting the Atmel AVR Dragon.....	5
4.2 Connecting the Atmel AVR JTAGICE mkII.....	6
4.3 Connecting of the Atmel AVR ONE!.....	6
5 Programming the kit.....	7
5.1 Programming via the bootloader.....	7
5.1.1 Step-by-step guide.....	7
5.2 Restoring the bootloader.....	8
6 Example applications.....	9
6.1 Preprogrammed firmware.....	9
7 How to compile example projects.....	10
7.1 Atmel AVR Studio 4.....	10
7.2 IAR Embedded Workbench.....	10
8 EVALUATION BOARD/KIT IMPORTANT NOTICE.....	11
9 Table of contents.....	12



Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
Tel: (+1)(408) 441-0311
Fax: (+1)(408) 487-2600
www.atmel.com

Atmel Asia Limited
Unit 01-5 & 16, 19F
BEA Tower, Millennium City 5
418 Kwun Tong Road
Kwun Tong, Kowloon
HONG KONG
Tel: (+852) 2245-6100
Fax: (+852) 2722-1369

Atmel Munich GmbH
Business Campus
Parkring 4
D-85748 Garching b. Munich
GERMANY
Tel: (+49) 89-31970-0
Fax: (+49) 89-3194621

Atmel Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chou-ku, Tokyo 104-0033
JAPAN
Tel: (+81) 3523-3551
Fax: (+81) 3523-7581

© 2011 Atmel Corporation. All rights reserved. / Rev.: CORP072610

Atmel®, Atmel logo and combinations thereof, AVR®, AVR® logo, megaAVR®, AVR Studio®, STK®, and others are registered trademarks or trademarks of Atmel Corporation or its subsidiaries. Windows® and others are registered trademarks of Microsoft Corporation in U.S. and or other countries. Other terms and product names may be trademarks of others.

Disclaimer: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. **EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.** Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.