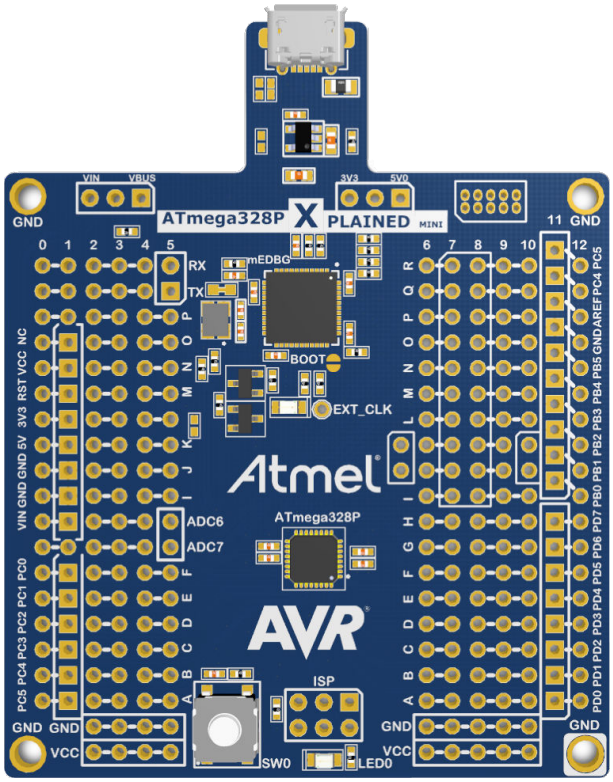
ATmega328P Xplained Mini

ATmega328P Xplained Mini

Preface

This user guide describes how to get started with the ATmega328P Xplained Mini evaluation kit. The evaluation kit is a hardware platform to evaluate the ATmega328P microcontroller. The on-board mini embedded debugger provides seamless integration with Atmel Studio. The kit provides access to the features of the ATmega328P enabling easy integration of the device in a custom design.



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1. Introduction

1.1 Features

The ATmega328P Xplained Mini evaluation kit provides a development platform for the ATmega328P.

Key Features

- On-board debugger with full source-level debugging support in Atmel Studio
- Auto-ID for board identification in Atmel Studio
- Access to all signals on the target MCU
- One green mEDBG status LED
- One yellow user LED
- One mechanical user push button
- Virtual COM port (CDC)
- External target CLK 16 MHz at 5V, 8 MHz at 3.3V
- USB powered
- 3.3V regulator
- Arduino shield compatible footprints
- Target SPI bus header footprint
- Xplained Pro extension headers can easily be strapped in

1.2 Board Overview

A brief overview of the default kit configuration, headers, and connectors.

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Figure 1-1. ATmega328P Xplained Mini Headers and Connectors

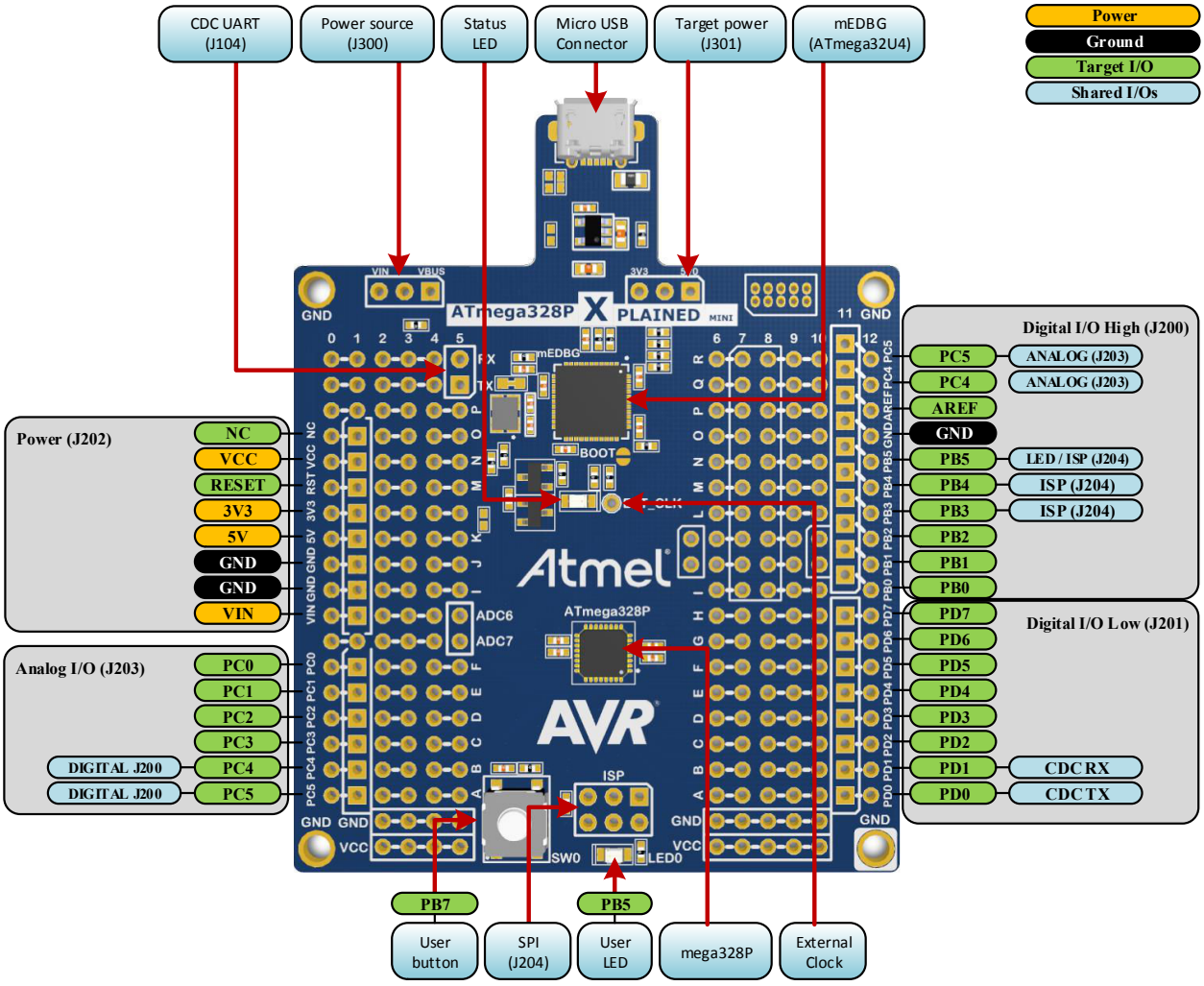


Table 1-1. Default Configurations

Function	Default configuration	Other settings
Kit power source (J300)	5.0V USB powered	External input VIN (1)
Target power (J301)	5.0V USB powered	3.3V from on-board regulator (1)
ATmega328P clock	16 MHz mEDBG clock (2)	Internal oscillator (3)

Info:
Changing the default settings require modification of the kit using a soldering iron.

1. Details on how to change the power settings are described in Power Sources.
2. Details on the mEDBG clock are described in Xplained Mini Clock Output.
3. Debugging through debugWIRE may be disabled if the internal oscillator is used.

2. Getting Started

2.1 Xplained Mini Quick Start

Steps to start exploring the Xplained Mini platform:

1. Download Atmel Studio.
2. Launch Atmel Studio.
3. Connect a USB cable (Standard-A to Micro-B or Micro-AB) between the PC and the USB port on the kit.

When the Xplained Mini kit is connected to your computer for the first time, the operating system will perform a driver software installation. The driver file supports both 32- and 64-bit versions of Microsoft® Windows® XP, Windows Vista®, Windows 7, Windows 8, and Windows 10. The drivers for the kit are included with the Atmel Studio.

Once the Xplained Mini board is powered the green status LED will blink and Atmel Studio will autodetect which Xplained Mini board is connected. Atmel Studio will present relevant information like data sheets and kit documentation. The ATmega328P device is programmed and debugged by the on-board Mini Embedded Debugger and therefore no external programmer or debugger tool is required.

2.2 Design Documentation and Related Links

The most relevant documents and software for the evaluation kit are available here:

ATmega328P Xplained Mini website - Kit information, latest user guide, and design documentation.

ATmega328P Xplained Mini on Microchip Direct - Buy this kit on microchipDIRECT.

- **Atmel Studio** - Free IDE for the development of C/C++ and assembler code for microcontrollers.
- **Xplained products** - Xplained evaluation kits are a series of easy-to-use evaluation kits for Microchip microcontrollers and other Microchip products.
  - Xplained Nano - used for low pin-count devices and provides a minimalistic solution with access to all I/O pins of the target microcontroller.
  - Xplained Mini - used for medium pin-count devices and adds Arduino Uno compatible header footprint and a prototyping area.
  - Xplained Pro - used for medium to high pin-count devices that features advanced debugging and standardized extensions for peripheral functions.

  Note: All the above kits have on-board programmers/debuggers, which creates a set of low-cost boards for evaluation and demonstration of features and capabilities of different Microchip products.
- **Atmel Spaces** - Open Source projects for Xplained Mini.
- **http://start.atmel.com/** - Atmel START is an online tool that helps the user to select and configure software components and tailor your embedded application in a usable and optimized manner.

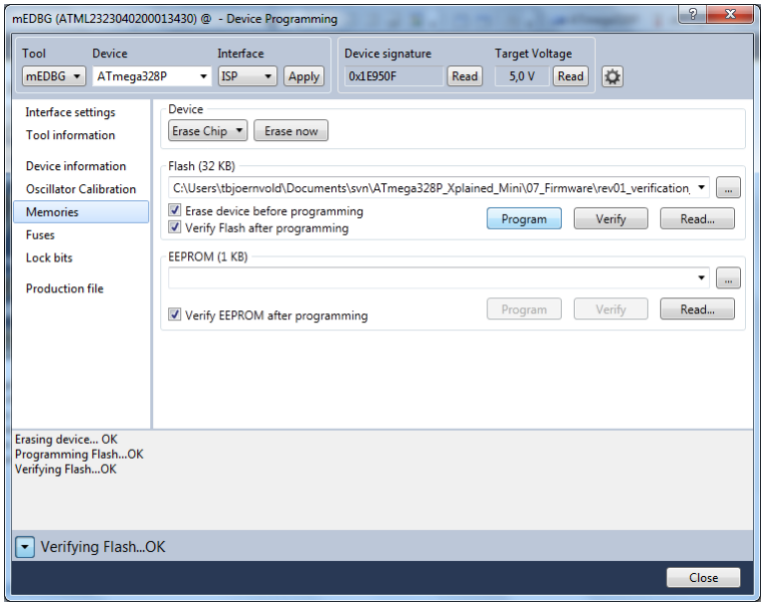
2.3 Programming and Debugging

2.3.1 Programming the Target Using mEDBG

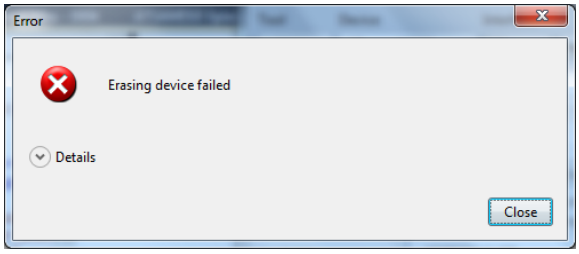
Using the Embedded Debugger on the ATmega328P Xplained Mini board to program the ATmega328P.

1. Connect the Xplained Mini USB to the PC.

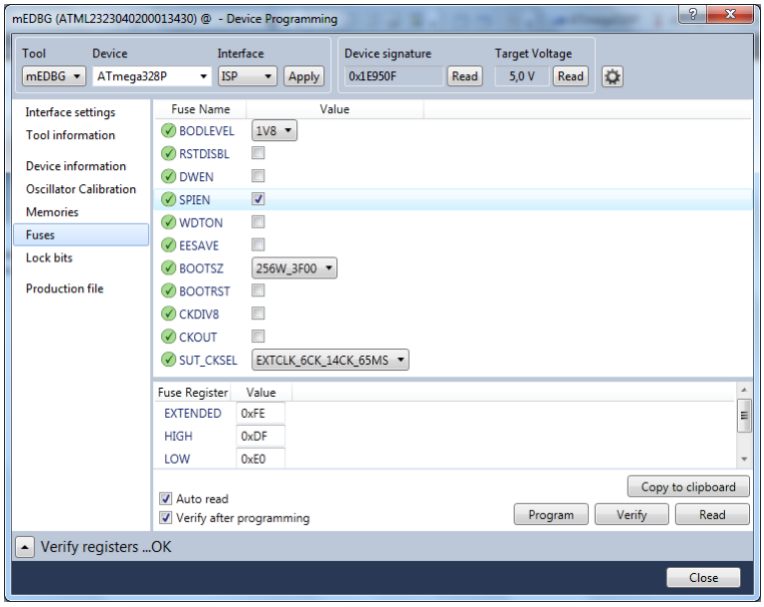
2. Go to Atmel Studio: Click the Tools tab, select Device Programming, and select the connected mEDBG as **Tool** with **Device** as ATmega328P and **Interface** to ISP, click **Apply**.
3. Select "Memories", locate the source .hex or .elf file, and click Program.



4. **NOTE:** If a previous debug session was not closed by selecting "Disable debugWIRE and Close" in the Debug menu, the DWEN fuse will be enabled and the target will still be in debug mode, i.e. it will not be possible to program the target using the ISP interface.



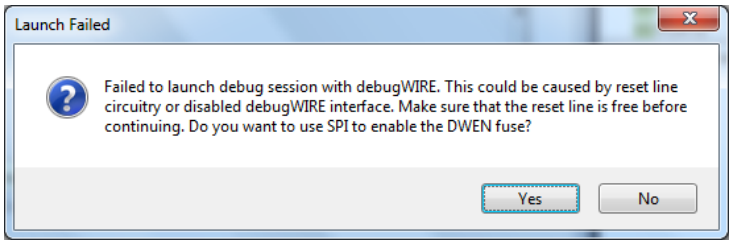
5. If the source file contains fuse settings, select "Production file" and upload the .elf file to program the fuses.
6. Select "Fuses" to program the fuses manually. Set the fuse(s) and click "Program". Recommended fuse settings:



2.3.2 Debugging the Target Using mEDBG

Using the Embedded Debugger on the ATmega328P Xplained Mini board to debug the ATmega328P via debugWIRE.

1. Start Atmel Studio.
2. Connect the Xplained Mini USB to the PC.
3. Open your project.
4. Click the "Project" tab and select the project "properties", click the "Tools" tab, and select mEDBG as debugger and debugWIRE as interface.
5. Click the "Debug" tab and select "Start Debugging and Break".
6. Atmel Studio will display an error message if the DWEN fuse in the ATmega328P is not enabled, click YES to make Studio set the fuse using the ISP interface.



7. A debug session is started with a break in main, the debugging can start.
8. To exit debug mode, select "Disable debugWIRE and Close" in the Debug tab. This will disable the DWEN fuse.

Info:
If debug mode is not exited by selecting "Disable debugWIRE and Close" in the Debug menu, the DWEN fuse will be enabled and the target will still be in debug mode, i.e. it will not be possible to program the target using ISP.

If any other CPU CLK than the external CLK supplied by the mEDBG is used, the debugWIRE is not guaranteed to work.

Applying a signal to J202/RESET (the RESET_SENSE signal) while debugging may result in unexpected behavior. This signal is NOT available during a debugging session because the RESET line is actively used by the debugWIRE interface.

2.3.3 Programming the Target Using an External Programmer

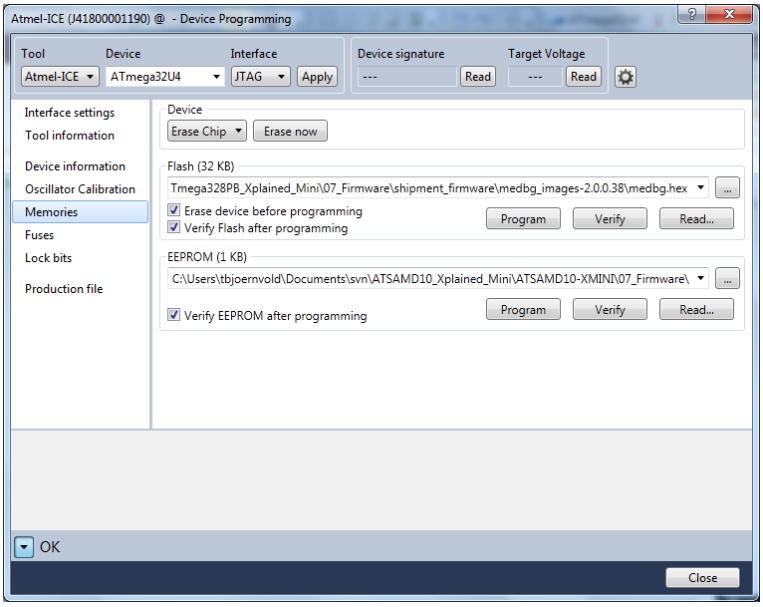
How to program the target ATmega328P using the AVR® JTAGICE mkII, JTAGICE3, Atmel-ICE, or other programmers.

1. Connect the External Programmer USB to the PC.
2. Connect the External Programmer to the ATmega328P Xplained Mini board ISP connector.
3. Go to Atmel Studio: Click the Tools tab, select Device Programming, and select the External Programmer connected as **Tool** with **Device** as ATmega328P and **Interface** to ISP, click **Apply**.
4. Select "Memories", locate the source .hex or .elf file, and click Program.

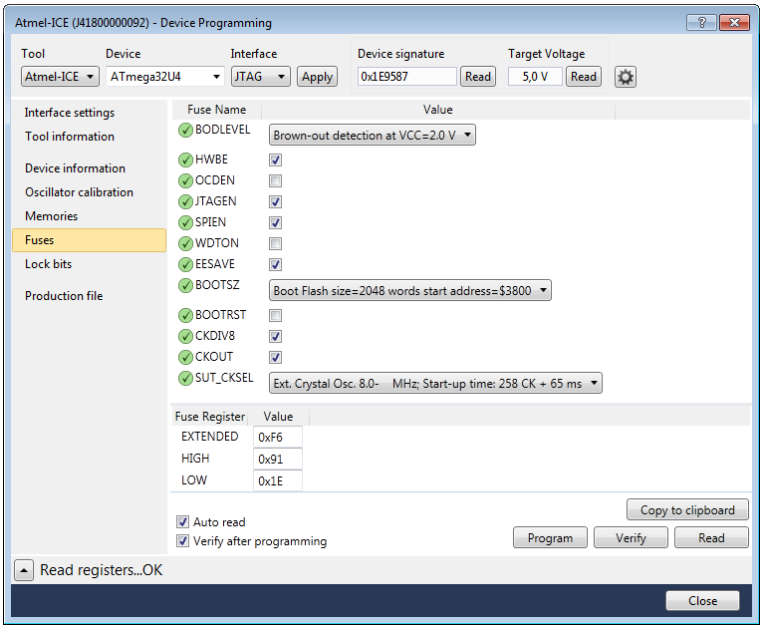
2.3.4 Programming the ATmega32U4 Using an External Programmer

How to program the ATmega32U4 using the AVR JTAGICE mkII, JTAGICE3, Atmel-ICE, or other programmers.

1. Connect the External Programmer USB to the PC.
2. Connect the External Programmer to the ATmega328P Xplained Mini board JTAG connector.
3. Go to Atmel Studio: Click the Tools tab, select Device Programming, and select the connected mEDBG as **Tool** with **Device** as ATmega32U4 and **Interface** to JTAG, click **Apply**.
4. Select "Memories", locate the source .hex or .elf file, and click Program.



5. Select "Fuses" to program the fuses manually. Set the fuse(s) and click "Program". Recommended fuse settings:



Warning: Changing the firmware in the ATmega32U4 will remove the programming and debugging capabilities of the mEDBG. If the EEPROM is altered the mEDBG may not be recognized by Atmel Studio anymore.

2.3.5 Programming the ATmega32U4 Using a Bootloader

This section describes how to use the bootloader to program the ATmega32U4.

1. Launch Atmel Studio.
2. Short strap J102.
3. Open the programming dialog, select the bootloader in the tool menu.
4. Connect the ATmega328P Xplained Mini board USB connector to the PC.
5. Select Device = ATmega32U4 (Device - Select).
6. Select USB communication (Ctrl+U).
7. Select the memory area to program (use the toggle memory button).
8. Select Load Hex file (Ctrl+L).
9. Select Programming Options.
10. Click "Run", observe the status in the status field.

Warning: Changing the firmware in the ATmega32U4 will remove the programming and debugging capabilities of the mEDBG. If the EEPROM is altered the mEDBG may not be recognized by Atmel Studio anymore.

3. Xplained Mini

Xplained Mini is an evaluation platform that provides a set of small boards with access to all microcontroller I/Os. The platform consists of a series of low-pin-count Microcontroller (MCU) boards, which are integrated with Atmel Studio to present relevant user guides, application notes, datasheets, and example code. The platform also features a Virtual COM port for serial communication to a host PC.

3.1 Mini Embedded Debugger

The ATmega328P Xplained Mini contains the Mini Embedded Debugger (mEDBG) for on-board programming and debugging. The mEDBG is a composite USB device of two interfaces; a debugger and a Virtual COM Port.

Together with Atmel Studio, the mEDBG debugger interface can program and debug the ATmega328P. On ATmega328P Xplained Mini, the ISP/dW interface is connected between the mEDBG and the ATmega328P.

The Virtual COM Port is connected to a UART on the ATmega328P and provides an easy way to communicate with the target application through the terminal software. It offers variable baud rate, parity, and stop bit settings.
Note: The settings on the ATmega328P must match the settings given in the terminal software.

Info: The virtual COM port in the mEDBG requires the terminal software to set the data terminal ready (DTR) signal to enable the UART pins connected to the ATmega328P. If the DTR signal is not enabled the UART pins on the mEDBG are kept in high-z (tri-state) rendering the COM port unusable. The DTR signal is automatically set by some terminal software, but it may have to be manually enabled in your terminal.

The mEDBG controls one status LED on the ATmega328P Xplained Mini. The table below shows how the LED is controlled in different operation modes.

Table 3-1. mEDBG LED Control

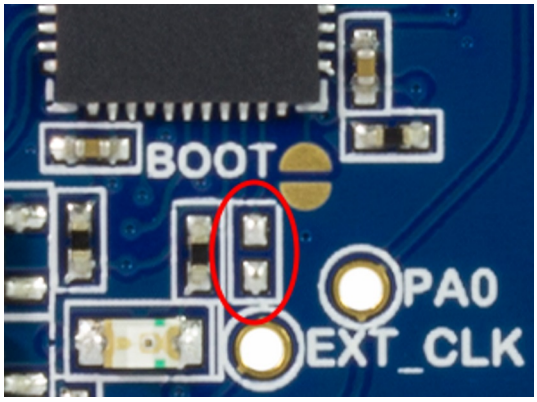
Operation mode	Status LED
Power up	LED is briefly lit
Normal operation	LED is not lit
Programming	Activity indicator; the LED flashes when programming/debugging with the mEDBG

3.1.1 Xplained Mini Clock Output

The mEDBG outputs its CPU clock on a pin. This clock pin is connected to the ATmega328P clock input and is used to have a synchronous clock with the mEDBG to enable debugging through debugWIRE.

To disconnect the external clock to the ATmega328P a 0Ω resistor or strap has to be removed from the footprint, as shown in the figure below (R109).

Figure 3-1. External Clock Footprint



The mEDBG CPU clock frequency depends on the selected voltage, see the table below.

Table 3-2. CPU Clock vs. Voltage

Target voltage	mEDBG CPU clock
3.3V	8 MHz
5.0V	16 MHz

3.2 mEDBG Configuration

The operation of the mEDBG can be configured by writing registers in the mEDBG. No configuration is required for default operation.

3.2.1 mEDBG Low Power Modes

There are two modes that enable the mEDBG to save power when connected to an external power source.

EOF mode, where the mEDBG is disabled. When enabled the ATmega32U4 will enter sleep mode if the USB does not enumerate within 5 seconds of power-up. In this mode, the external clock is not available to the target MCU.

LOWP mode, where the mEDBG is set to run at 1 MHz. Saving power while maintaining the USB connection for the COM port. The external clock will be 1 MHz.

Table 3-3. Low Power Modes Operation

Mode	External CLK	COM port	ISP/dW program	ISP/dW debug
EOF	disabled	disabled	disabled	disabled
LOWP	forced 1 MHz	enabled	useless	useless
Factory settings	enabled	enabled	enabled	enabled

3.2.2 mEDBG Fuse Filter

The mEDBG does not initially allow users to program all fuses of the target device through Atmel Studio, as a filter is implemented to protect certain fuses. The protected fuses are different for every product using the mEDBG and are typically clock related fuses that could be set to invalid configurations.

The fuse protection can be disabled by writing the FUSE bit to 0.

Info: The fuse filter prevents users from changing critical fuses using Atmel Studio; however, it does not prevent users from setting fuses freely using the command line interface atprogram bundled with Atmel Studio.

3.2.3 mEDBG Command Line Interface

The configuration of the mEDBG can be changed using a simple command line interface available on Atmel Spaces Releases (mEDBG_script.zip).

The CLI is written for Python® 2.7 and may work on other Python 2.x versions. Python can be downloaded from Python.

The CMSIS-DAP commands used by the CLI are not supported in early mEDBG firmware versions. To upgrade the firmware, download the latest version of Atmel Studio and connect to the mEDBG with the programming dialog.

The register definitions are available in the following sections.

Related Links

SUFFER

3.2.4 Super User Fantastic Feature Enable Register

The Super User Fantastic Feature Enable Register allows the user to modify the behavior of the mEDBG.

Name: SUFFER
Offset: 0x0120
Reset: 0xFF
Property: N/A

Bit	7	6	5	4	3	2	1	0
						EOF	LOWP	FUSE
Access						R/W	R/W	R/W
Reset						1	1	1

Bit 2 – EOF: Extended Off
Writing the EOF bit to 1 sets default operation. Writing the EOF bit to 0 enables the extended off power mode. If no USB enumeration is successful within five seconds of power up, the mEDBG enters deep sleep.

Bit 1 – LOWP: Low Power
Writing the LOWP bit to 1 sets the system clock to its default value. Writing the LOWP bit to 0 enables low power mode. The mEDBG is set to run at 1 MHz, which decreases the power usage.

Bit 0 – FUSE: FUSE Protection
Writing the FUSE bit to 1 enables fuse protection when using Atmel Studio. The fuse protection prevents modification of specific fuses in the ATmega328P target device that could make the mEDBG on the ATmega328P Xplained Mini not usable. Writing the FUSE bit to 0 removes all protection of fuses in the ATmega328P target device.

Warning: Writing the FUSE bit to 0 enables modification of all fuses in the ATmega328P. Setting wrong fuse settings may render the mEDBG not usable on the ATmega328P Xplained Mini. As an example; if an invalid clock setting is set, a recovery may require an external debugger.

3.3 mEDBG Firmware Upgrade and Manual Bootloader Entry

The mEDBG firmware is updated through the programming dialog in Atmel Studio.

If you are unable to upgrade the mEDBG firmware on your ATmega328P Xplained Mini, you can try the command line utility *atfw.exe* provided with the Atmel Studio. *atfw.exe* is located in the *atbackend* folder in your Atmel Studio install location.

To manually upgrade the firmware, run the following command:

atfw.exe -t medbg -a ..\tools\ mEDBG\medbg_fw.zip

If *atfw.exe* is unable to find the mEDBG it may be required to force the ATmega32U4 (mEDBG) to enter its bootloader. To force the bootloader entry, short-circuit the BOOT pads (J102) and toggle power to the ATmega328P Xplained Mini board. Run the atfw command above. When the firmware is upgraded, remove the power from the kit and remove the short-circuit of J102.

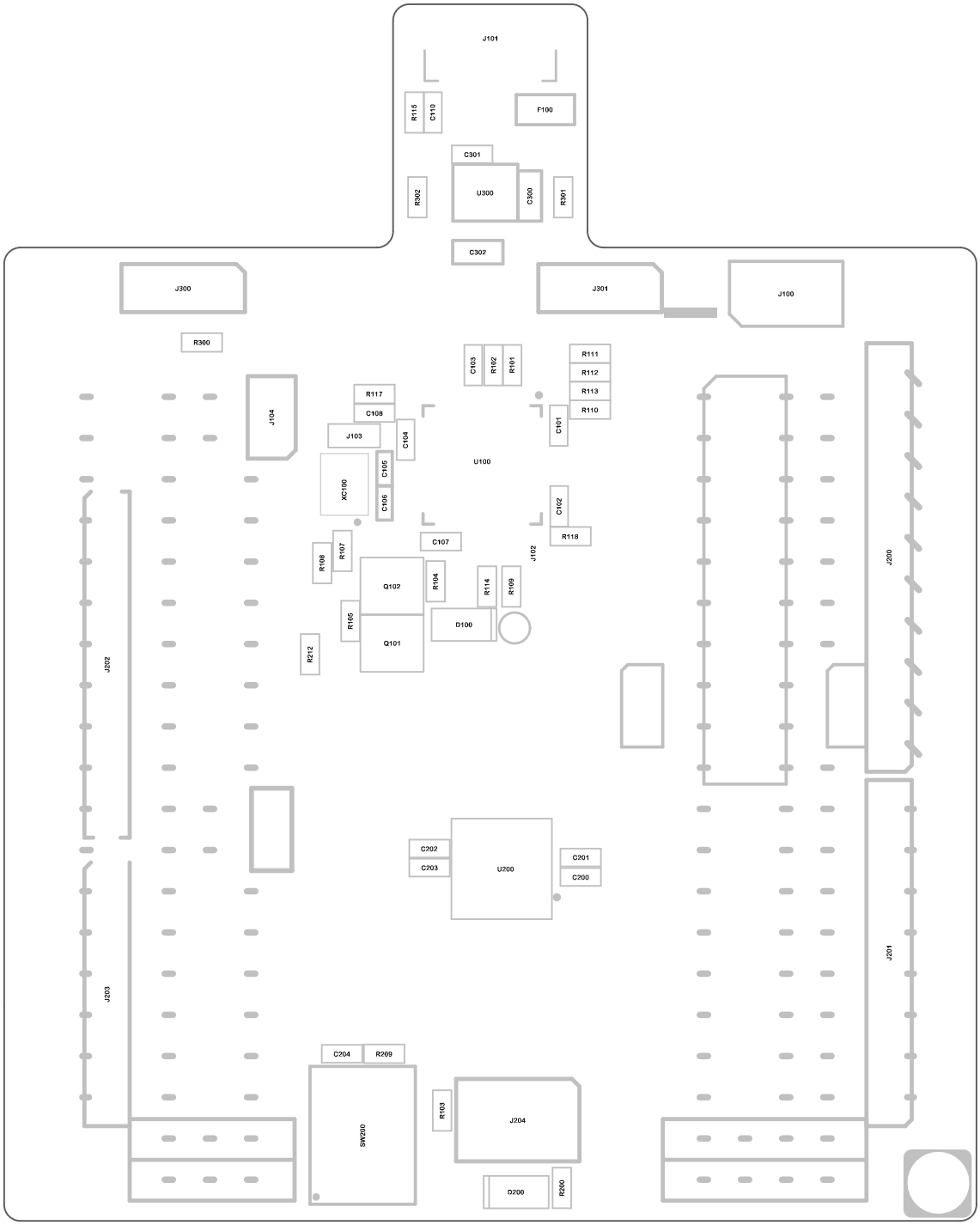
Figure 3-2. Force Boot Jumper

4. Hardware User Guide

The following sections describe the implementation of the relevant peripherals, headers, and connectors on the ATmega328P Xplained Mini and their connections to the ATmega328P. The tables of connections in the sections below also describe which signals are shared between the headers and on-board functionality.

The figure below shows the assembly drawing of the ATmega328P Xplained Mini to help identification of components.

Figure 4-1. ATmega328P Xplained Mini Assembly Drawing



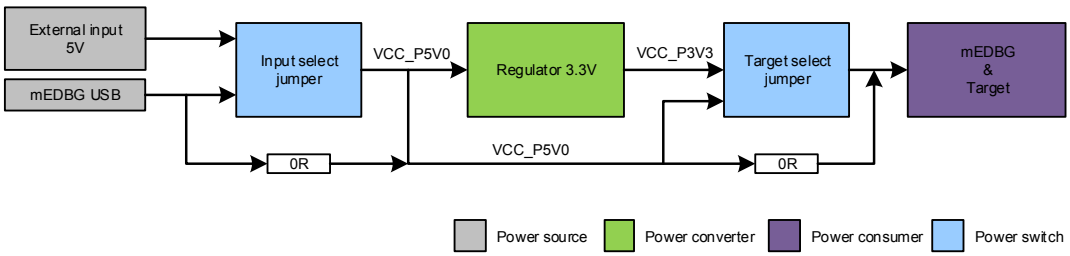
4.1 Power Sources

The ATmega328P Xplained Mini kit can be powered by a USB or an external voltage input VIN. The default power source is 5.0V from a USB. The USB port is protected with a 500 mA PTC resettable fuse.

The ATmega328P is powered from the 5.0V USB voltage by default.

The figure below shows the possible kit power supply connections.

Figure 4-2. Power Supply Block Diagram



The input voltage select jumper (J300, 3-pin header footprint) can be soldered in to select between power from the USB port or from the VIN pin on the Arduino power header footprint. By default, the selector is bypassed with a 0Ω resistor (R300) to connect the USB voltage to the on-board 3.3V/150 mA regulator and target voltage select header.

The target voltage select jumper (J301, 3-pin header footprint) can be soldered in to select between the on-board 3.3V regulator or the voltage from the input voltage select jumper (J300). The selector is bypassed with a 0Ω resistor (R301) to connect the kit input voltage to the ATmega328P and mEDBG.

Important: If the target voltage and input voltage select headers are soldered in and used with a jumper, the bypass 0Ω resistors have to be removed to avoid contention.

4.2 Board Assembly

The Xplained Mini board can easily be assembled into a product prototype for software development and hardware verification. All signals of the ATmega328P are available in the Xplained Mini board connector grid, enabling easy connection of external sensors and output devices in order to prototype the customer specific application.

4.2.1 Connecting an Arduino Shield

Arduino® shields can be mounted in the marked positions (J200, J201, J202, J203, and J204).

Warning: The ATmega328P Xplained Mini connects VCC_TARGET to the Arduino SPI connector, while all Arduino boards connect VCC_P5V0 to the same pin. The VCC_TARGET may be either 3.3V or 5.0V depending on the configuration of the kit if the kit is configured for 3.3V operation. Connecting an Arduino shield may damage the board permanently. It is not recommended to solder the SPI connector when using Arduino shields if not strictly necessary. If the connector is required it is recommended to remove pin two from the SPI connector.

4.3 Target Headers and Connectors

4.3.1 Target Digital I/O

The J200 and J201 headers provide access to the ATmega328P digital I/O pins.

Table 4-1. J200 Digital I/O High Byte Header

J200 pin	ATmega328P pin	Function
1	PB0	
2	PB1	
3	PB2	SS, SPI Bus Master Slave select
4	PB3	MOSI, SPI Bus Master Output/Slave Input
5	PB4	MISO, SPI Bus Master Input/Slave Output
6	PB5	SCK, SPI Bus Master Clock Input
7	GND	
8	AREF	
9	PC4	SDA, 2-wire Serial Bus Data Input/Output Line. Shared with ADC4.
10	PC5	SCL, 2-wire Serial Bus Clock Line. Shared with ADC5.

Table 4-2. J201 Digital I/O High Low Header

J201 pin	ATmega328P pin	Function
1	PD0	RXD (ATmega328P USART Input Pin)
2	PD1	TXD (ATmega328P USART Output Pin)
3	PD2	
4	PD3	
5	PD4	
6	PD5	
7	PD6	
8	PD7	

4.3.2 Board Power Header

The J202 header enables connection to the ATmega328P Xplained Mini power system.

Table 4-3. J202 Power Header

J202 pin	Signal	Description
1	NC	
2	VCC_TARGET	The power source selected for the target (selected by J301)
3	RESET_SENSE	This is a RESET signal monitored by the mEDBG, if pulled low the target RESET line will be pulled low by the mEDBG. The ATmega32U4 internal pull-up is enabled. This signal is not available during debugging.
4	VCC_P3V3	The 3.3V regulator output
5	VCC_P5V0	The selected power source (VIN or VBUS selected by J300)

J202 pin	Signal	Description
6	GND	
7	GND	
8	VCC_VIN	The external power source connection

4.3.3 Target Analog I/O

The ATmega328P ADC input pins are available in the J203 header.

AREF is available in J200 pin 8.

Table 4-4. J203 Analog Header

J203 pin	ATmega328P pin	Function
1	PC0	ADC Input Channel 0
2	PC1	ADC Input Channel 1
3	PC2	ADC Input Channel 2
4	PC3	ADC Input Channel 3
5	PC4	ADC Input Channel 4
6	PC5	ADC Input Channel 5

4.3.4 Target Programming

The J204 header enable direct connection to the ISP bus with an external programmer for programming of the ATmega328P.

Table 4-5. ISP Header

J204 pin	ATmega328P pin	Function
1	PB4	MISO
2		VCC target
3	PB5	SCK
4	PB3	MOSI
5	PC6	RESET
6		GND

4.3.5 Target Additional I/O

Signals not available in any of the headers or connectors are available in column 5 of the grid.

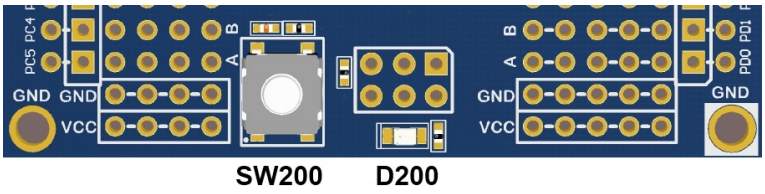
Table 4-6. Additional I/O

ATmega328P pin	Grid position
ADC6	H5
ADC7	G5

4.4 Target Peripherals

The ATmega328P Xplained Mini has one LED and one push button.

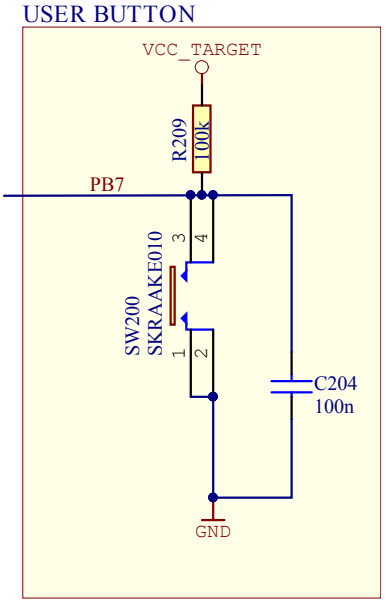
Figure 4-3. Peripherals



4.4.1 Push Button

A general purpose push button, SW200, is connected to PB7.

Figure 4-4. Push Button

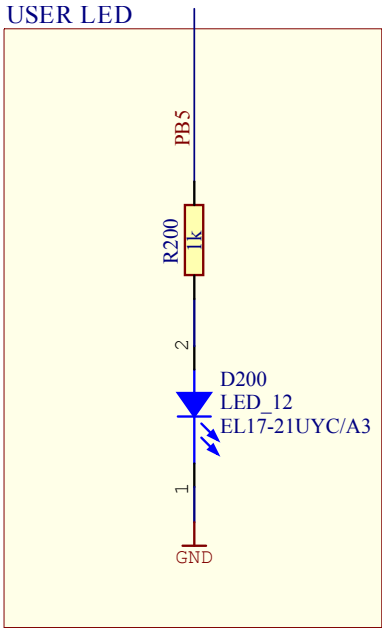


4.4.2 User LED

There is one yellow LED, D200, available for use by the application SW.

The LED is connected to ATmega328P, pin 17 - PB5. The SCK signal from the mEDBG is in tri-state when not used.

Figure 4-5. User LED



4.5 mEDBG

The ATmega328P Xplained Mini board has an embedded debugger/programmer enabling debugging and programming of the ATmega328P without any additional external equipment.

4.5.1 mEDBG COM Port Connection

The mEDBG provides a CDC COM port connection when connected to a USB host device.

The mEDBG (ATmega32U4) USART is used for communication with the CDC COM port. The USART TX/RX signals are available on the J104 header and are also connected to the ATmega328P via 0Ω resistors enabling easy disconnect from the ATmega328P, if needed. The RX/TX silk screen notation next to J104 refers to the RX and TX pins of the mEDBG (ATmega32U4).

Table 4-7. J104 USART Header

J104 pin	ATmega32U4	ATmega328P	Function
1 - USART TxD	PD3	PD0 (RxD)	TxD out from ATmega32U4
2 - USART RxD	PD2	PD1 (TxD)	RxD in to ATmega32U4

4.5.2 mEDBG JTAG Interface

The mEDBG (ATmega32U4) JTAG interface is available for programming and debugging of the ATmega32U4 on the 50-mil header in the upper right corner of the kit.

Table 4-8. J100 JTAG Header

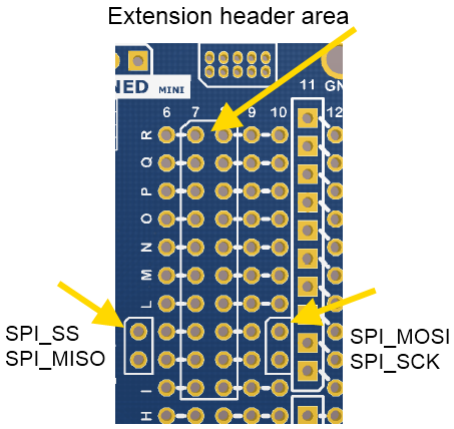
J100 pin	Signal name	Description
1	TCK	
2	GND	
3	TDO	

J100 pin	Signal name	Description
4	VCC_BOARD	ATmega32U4 V_{CC} (J301 pin 2)
5	TMS	
6	RESET	Connected to ATmega32U4 only
7	NC	
8	NC	
9	TDI	
10	GND	

4.6 Extension Header Area

The marked area on the grid I7 to R8 can be used for strapping in an Xplained Pro extension header or a 10-pin legacy Xplained/RZ600 header.

Figure 4-6. Extension Header Area



The SPI bus signals are available close to the header at row J and K, enabling easy connection to header pin 15 to 18.

Using pin 11 to 20 enables connection of the 10-pin legacy header used on the RZ600 wireless modules and the 10-pin Xplained sensor modules.

The general bus connections for an Xplained Pro Extension board are indicated in the table below. Detailed wiring can be found in the selected extension board documentation.

Table 4-9. Extension Header Typical Signals

Pin	Signal name	Signal description
1	ID	Communication line to the ID chip on the Xplained extension board
2	GND	Ground
3	ADC(+)	Analog to digital converter, alternatively positive part of differential ADC
4	ADC(-)	Analog to digital converter, alternatively negative part of differential ADC
5	GPIO1	General purpose I/O

Pin	Signal name	Signal description
6	GPIO2	General purpose I/O
7	PWM(+)	Pulse width modulation, alternatively positive part of differential PWM
8	PWM(-)	Pulse width modulation, alternatively negative part of differential PWM
9	IRQ/GPIO	Interrupt request line and/or general purpose I/O
10	SPI_SS_B/ GPIO	Slave B select for SPI and/or general purpose I/O
11	I2C_SDA	Data line for I^2C interface
12	I2C_SCL	Clock line for I^2C interface
13	UART_RX	Receiver line of ATmega328P USART
14	UART_TX	Transmitter line of ATmega328P USART
15	SPI_SS_A	Slave A select for SPI
16	SPI_MOSI	Master out slave in line of serial peripheral interface
17	SPI_MISO	Master in slave out line of serial peripheral interface
18	SPI_SCK	Clock for serial peripheral interface
19	GND	Ground
20	VCC	Power for extension board

4.7 Factory Programmed

The ATmega328P is preprogrammed with a demo program; ReMorse.

The source code is available in Atmel Spaces.

When the CDC COM port is connected to a terminal window (9600 8N1), the text you write will be transmitted via the LED in Morse code. Any Morse code transmitted by using the button will be displayed as text in the terminal window.

The ATmega32U4 is preprogrammed with the mEDBG firmware.

5. Hardware Revision History and Known Issues

This user guide provides the latest available revision of the kit. This chapter contains information about known issues, a revision history of older revisions, and how older revisions differ from the latest revision.

5.1 Identifying Product ID and Revision

The revision and product identifier of Xplained Mini boards can be found in two ways; either through Atmel Studio or by looking at the sticker on the bottom side of the PCB.

By connecting an Xplained Mini board to a computer with Atmel Studio running, an information window will pop up. The first six digits of the serial number, which is listed under kit details, contain the product identifier and revision.

The same information can be found on the sticker on the bottom side of the PCB. Most kits will print the identifier and revision in plain text as A09-nnnn\rr, where nnnn is the identifier and rr is the revision. Boards with limited space have a sticker with only a data matrix code, which contains a serial number string.

The serial number string has the following format:

"nnnnrrssssssssss"

n = product identifier

r = revision

s = serial number

The product identifier for ATmega328P Xplained Mini is A09-2323.

5.2 Revision 4

Revision 4 is the initial released revision, and there are no known issues.

6. Document Revision History

Document revision	Date	Comment
A	09/2017	Converted to Microchip format and replaced the Atmel document number 42287C. Restructured the user guide. Added the Hardware Revision History and Known Issues chapter.
42287C	08/2015	Updated version
42287B	10/2014	Updated version
42287A	05/2014	Initial document release

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