APPLICATION NOTE

AVR1939: XMEGA-C3 Xplained Getting Started Guide

Atmel XMEGA C

Features

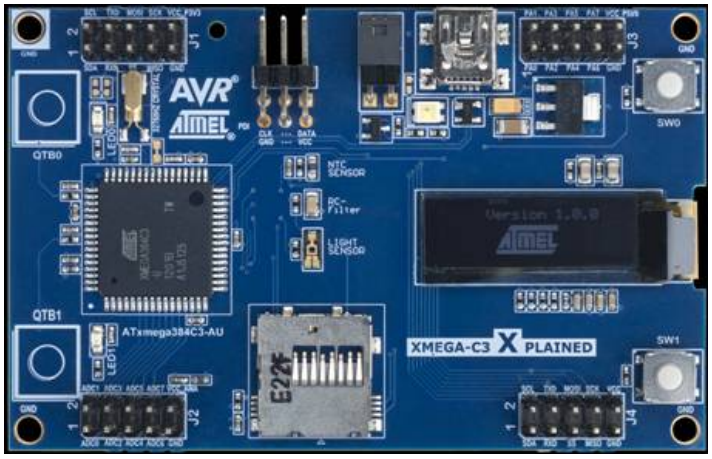
- Atmel® AVR® ATxmega384C3 microcontroller
- OLED display with 128x32 pixels resolution
- Analog sensors
  - Ambient light sensor
  - Temperature sensor
- Analog filter
- Digital I/O
  - Two mechanical buttons
  - Two user LEDs, one power LED, and one status LED
  - Four expansion headers
- Touch
  - Two Atmel AVR QTouch® button
- Memory
  - microSD Card

Introduction

The Atmel AVR XMEGA-C3 Xplained evaluation kit is a hardware platform to evaluate the Atmel ATxmega384C3 microcontroller.

The kit offers a larger range of features that enables the Atmel AVR XMEGA® user to get started using XMEGA peripherals right away and understand how to integrate the XMEGA device in their own design.

Figure 1. XMEGA-C3 Xplained Evaluation Kit



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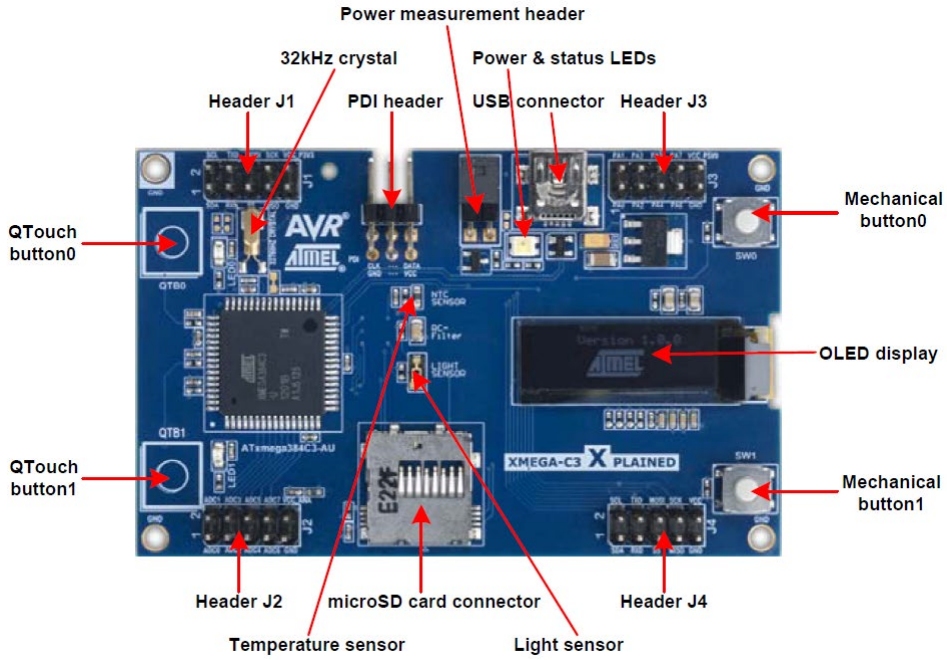
1. Board Overview

Figure 1-1 shows most of the available features on the board. For more detailed information on the Atmel XMEGA-C3 Xplained hardware, take a look at the Atmel application note "Atmel AVR1925: XMEGA-C3 Xplained Hardware User's Guide".

Figure 1-1. Overview of XMEGA-C3 Xplained Kit



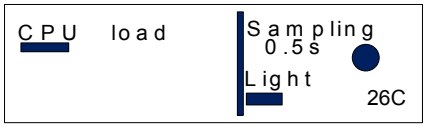
2. Quick-Start

To be able to run the preprogrammed code, you need to connect the Atmel AVR XMEGA-C3 Xplained evaluation kit with a USB cable (standard A to mini-B or mini-AB) to a PC or USB hub.

Once the kit is powered, the display first shows explanation of how to use the demonstration; SW1 pressed will skip this explanation.

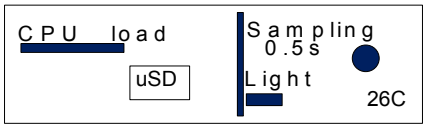
The application starts then a sensor acquisition task scheduled by the real-time counter (RTC). The temperature and light sensors values are displayed on the OLED. Pressing QTB0 increases sampling rate per 0.5s. Pressing QTB1 decreases sampling rate per 0.5s.

Figure 2-1. Default Display during Sensors Acquisition



When a microSD card is inserted, microSD icon is displayed. During microSD card installation, a rectangle shows the read/write access and the CPU load is increased consequently.

Figure 2-2. Display when microSD Card is Active



Pressing SW0 activates USB, the USB icon is displayed.

Figure 2-3. Display when USB is Activated

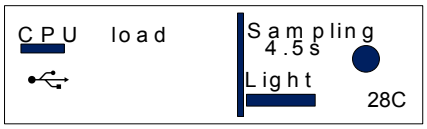
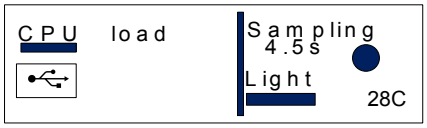


Figure 2-4. Display when the USB Host opens the Virtual Port



CPU activity varies according to demo modes. When USB is activated, display will show a CPU load light increase while USB Host accesses to microSD with multiple read/write operations will increase consequently this CPU load.

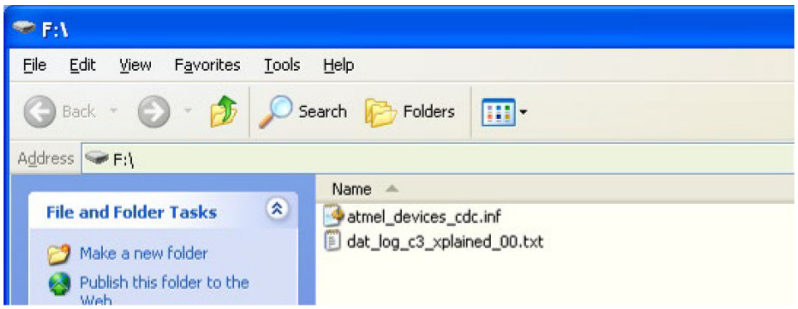
The demo application allows also the XMEGA-C3 Xplained board to communicate with a USB device composite including:

- a USB Mass Storage Class (MSC)
- a USB Communication Device Class (CDC)

The MSC interface uses the native driver from USB host O.S. and does not require a specific setup. Thus, the microSD card is mounted as an external disk in O.S.

To avoid a file system corruption, the data logging is stopped on microSD while the USB is enabled. All sensor data logged on the microSD card are stored in a file named dat_log_c3_xplained_xx.txt where xx will be incremented from 00 for each new session of sensors data storage on the card.

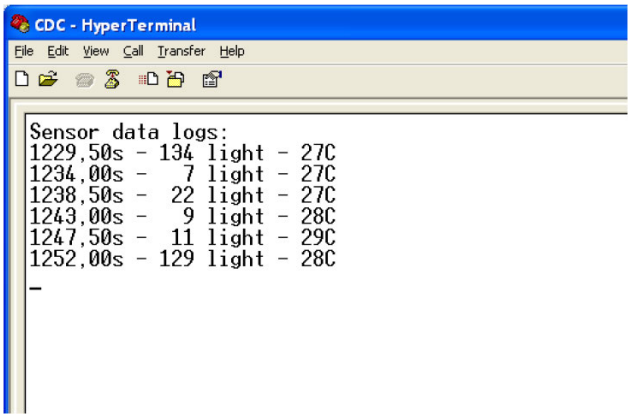
Figure 2-5. USB Mass Storage Class and Removable Disk Content



The CDC interface uses the native driver from UNIX® O.S., but requires a specific one on Windows® O.S. When the USB feature is disabled, the Windows driver file is created by demo application on the microSD card. After USB MSC startup or through another SD card reader, the atmel_devices_cdc.inf file can be selected to install the new USB CDC interface.

After having installed the CDC driver, the Virtual COM port can be opened through a terminal.

Figure 2-6. USB Communication Device Class



Note: The Virtual COM port is not connected to a true RS232 COM port, thus the baudrate and parity parameters can be ignored.

The demo application for the XMEGA-C3 Xplained is available through the Atmel Software Framework (ASF), version 3.5.0 or later. The demo application is available as an example project in Studio 6 and can be accessed by clicking File -> New -> Example Project, and selecting “Demo application for XMEGA-C3 Xplained”. In-depth documentation for the demo application is available in the Atmel AT01639 XMEGA-C3 Xplained Software User Guide.

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 with Studio 6. More information about all available documentation and tools is available in the Chapter 4.

2.1 Programming the Kit

2.1.1 Using the Bootloader

The kit can be programmed either from an external programming tool or through a USB bootloader which is pre-programmed on the device. The bootloader is evoked by pushing the push button (SW0) during power-on, for example push and hold the button and hence connect an USB cable to the kit. Programming can be performed through the DFU programmer FLIP. How to use FLIP to download new firmware to the kit is described in-depth in the application note Atmel AVR1916: USB DFU Boot Loader for XMEGA.

2.1.2 Using a Programming Tool

If it is desired to program the kit without the help of the on-chip bootloader, or if debugging is required, it is possible to do this with various tools. The most common tools and how they can be connected are listed in Chapter 3. Atmel Studio® 6 can be used as front-end for these programming tools.

3. Connecting the Kit

3.1 USB Power Supply

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

Do not power the board without having the jumper next to the USB connector or an amperemeter mounted.

When connecting the Atmel XMEGA-C3 Xplained to a PC, the operating system will request a driver file for installing the serial communication driver. This driver file is available in micro SD card which was written by the initial application firmware. The driver file supports both 32- and 64-bit versions of Windows XP and Windows 7. Driver installs are not necessary on Linux® operating systems.

3.2 Atmel AVR JTAGICE3

Figure 3-1. The 100mil PDI Adapter must be used to Connect to the Kit

3.3 Atmel AVR ONE!

The AVR ONE! PDI connector can be connected to the XMEGA-C3 Xplained kit with a standoff adapter (the adapter is marked with "nr.1").

Figure 3-2. Connecting Atmel AVR ONE! to an Atmel XMEGA-C3 Xplained Board

3.4 Atmel AVR JTAGICE mkII

The grey female 10-pin header on the AVR JTAGICE mkII has to be used when connecting to the kit. The opening in the board is made to fit the orientation tab on the header.

Note: When using PDI with the AVR JTAGICE mkII it is necessary to use the squid cable. Follow the instructions in the AVR JTAGICE mkII manual and the silkscreen description for the programming header.

Figure 3-3. Connecting AVR JTAGICE mkII to an XMEGA-C3 Xplained Board

3.5 Atmel AVR Dragon

In order to connect the AVR Dragon™ to the XMEGA-C3 Xplained, a 6-pin header cable is needed. Connect the cable between the JTAG connector on the AVR Dragon kit and the XMEGA-C3 Xplained JTAG connector. Pin 1 on the XMEGA-C3 Xplained kit is marked with a square pad.

4. Tools and Documentation for the Atmel XMEGA-C3 Xplained

The following list contains links to the most relevant documents, software, and tools for the XMEGA-C3 Xplained:

Xplained products

Atmel AVR Xplained is a series of small-sized and easy-to-use evaluation kits for 8- and 32-bit AVR microcontrollers. It consists of a series of low cost MCU boards for evaluation and demonstration of feature and capabilities of different MCU families.

Xplained USB CDC driver

The driver file supports both 32- and 64-bit versions of Windows XP and Windows 7. Driver installs are not necessary on Linux operating systems.

XMEGA-C3 Xplained schematics

Package containing schematics, BOM, assembly drawings, 3D plots, layer plots, etc.

AVR1925: XMEGA-C3 Xplained Hardware Users Guide

Hardware Users Guide for the XMEGA-C3 Xplained.

AVR1939: XMEGA-C3 Xplained Getting Started Guide

This document.

AT01639: XMEGA-C3 Xplained Software User Guide

User Guide for the XMEGA-C3 Xplained demo software.

AVR1916: XMEGA USB DFU Bootloaders

User Guide for the XMEGA USB DFU bootloaders.

Atmel Studio 6

Free Atmel IDE for development of C/C++ and assembler code for Atmel microcontrollers.

Atmel FLIP (Flexible In-system Programmer)

BatchISP (FLIP) is a command line tool for programming the flash and EEPROM memories of the AVR and is part of the FLIP installation. It can be used to communicate with the preprogrammed USB DFU bootloader.

Atmel JTAGICE3

Mid-range development tool for Atmel 8- and 32-bit AVR microcontrollers with on-chip debugging for source level symbolic debugging, NanoTrace (if supported by the device) and device programming.

Atmel AVR JTAGICE mkII

A mid-range development tool for Atmel 8- and 32-bit AVR devices with on-chip debugging for source level symbolic debugging, NanoTrace (if supported by the device) and device programming (superseded by JTAGICE3).

Atmel AVR ONE!

A professsional development tool for all Atmel 8- and 32-bit AVR devices with On-Chip Debug capability. It is used for source level symbolic debugging, program trace and device programming. AVR ONE! supports the complete development cycle and is the fastest debugging tool offered from Atmel.

Atmel AVR Dragon

The AVR Dragon sets a new standard for low cost development tools for 8- and 32-bit AVR devices with On Chip Debug (OCD) capability.

IAR Embedded Workbench® for Atmel AVR

IAR™ Embedded Workbench is a commercial C/C++ compiler that is available for 8-bit AVR. There is a 30 day evaluation version as well as a 4k (code size limited) kick-start version available from their website.

5. 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.

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6. Revision History

Doc. Rev.	Date	Comments
42054B	02/2015	Document AVR1940 has been renamed to AT01639. Hyperlink to the correct document has been updated. A faulty hyperlink in Section 2.1.1 has also been corrected.
42054A	02/2013	Initial document release.

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