AVR 8-bit Microcontrollers

AVR42781: Getting Started With ATtiny417/814/816/817

APPLICATION NOTE

Description

This application note outlines how to get started with the Atmel® ATtiny417/814/816/817 AVR®-based microcontrollers.

This application note focuses mostly on ATtiny817, but as ATtiny417/814/816 are subsets of ATtiny817, the information provided here is applicable to all of these devices. For further information on the differences between the devices, refer to the datasheet.

Features

- Getting started with Atmel ATtiny417/814/816/817 microcontrollers and tools
- Getting started with Atmel ATtiny817 Xplained Mini and Atmel Studio 7.0

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1. Get the Device Datasheet

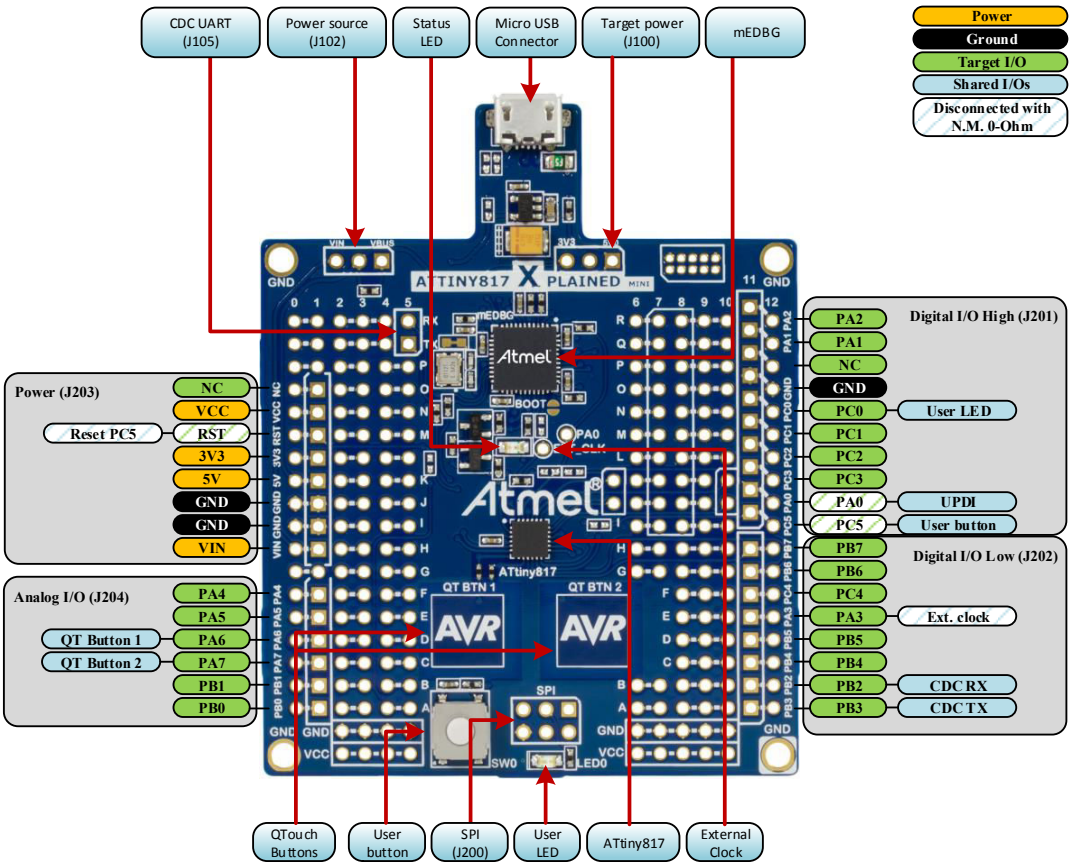
Web page: http://www.atmel.com/devices/attiny817.aspx

Document/file: Atmel ATtiny417/814/816/817 Datasheet (summary, complete)(.pdf)

- There are two versions:
  - Complete version (includes all peripheral descriptions and electrical characteristics)
  - Summary version

2. Get the ATtiny817 Xplained Mini Evaluation Kit

Figure 2-1. ATtiny817 Xplained Mini Kit



Web page: http://www.atmel.com/tools/attiny817-xmini.aspx

Get the kit: http://www.atmel.com/tools/attiny817-xmini.aspx#buy

Document/file:

- ATtiny817 Xplained Mini User Guide (.pdf)

Key features:

- ATtiny817 microcontroller
- One yellow user LED
- One mechanical button
- Two QTouch® buttons
- mEDBG
  - Auto-ID for board identification in Atmel Studio
  - One green board status LED
  - Programming and Debugging
  - Virtual COM port (CDC)
- USB powered
- ATtiny817 Power sources

  - 5.0V from USB
  - 3.3V regulator
  - external voltage
- Arduino shield compatible footprints

The ATtiny817 Xplained Mini User Guide covers how to power the kit, the detailed information on board components, extension interface and the hardware guide.

3. Get the Tools

Atmel Studio 7.0, which uses GCC compiler, is the preferred IDE to get started with ATtiny417/814/816/817.

3.1. Get Atmel Studio 7.0

Web page: http://www.atmel.com/tools/atmelstudio.aspx

Document/file:

- Atmel Studio 7.0 (build 1006) Installer - Full (.exe)

Atmel Studio 7.0 or later is the preferred IDE for developing and debugging firmware for ATtiny417/814/816/817.

3.2. Get IAR Embedded Workbench for AVR

Web page: https://www.iar.com/iar-embedded-workbench/#!?architecture=AVR

Document/file: IAR™ installer for AVR

3.3. Get Source Code from Atmel START

The example code is available through Atmel START, which is a web-based tool that enables configuration of application code through a graphical user interface. The code can be downloaded for both Atmel Studio 7.0 and IAR IDE via the **Examples**-link below, or the **BROWSE EXAMPLES** button on the Atmel START front page.

Web page: http://start.atmel.com/

Documentation: http://start.atmel.com/static/help/index.html

Examples: http://start.atmel.com/#examples

In the Examples-browser, search for: AVR42781 (press **User Guide** in Atmel START for detailed requirements for the example project).

Double-click the downloaded .atzip file and the project will be imported to Atmel Studio 7.0.

For information on how to import the project in IAR, press the **Documentation**-link above, select ‘Atmel Start Output in External Tools' and 'IAR Embedded Workbench®'.

4. Atmel Studio 7.0 Users Getting Started

Prerequisites:

- Atmel Studio 7.0 or above installed
- The ATtiny817 Xplained Mini board connected to Atmel Studio 7.0 via the on board USB connector which is connected to the embedded debugger. The kit will be powered by the USB, and the embedded debugger will enable debugging and programming via the USB.

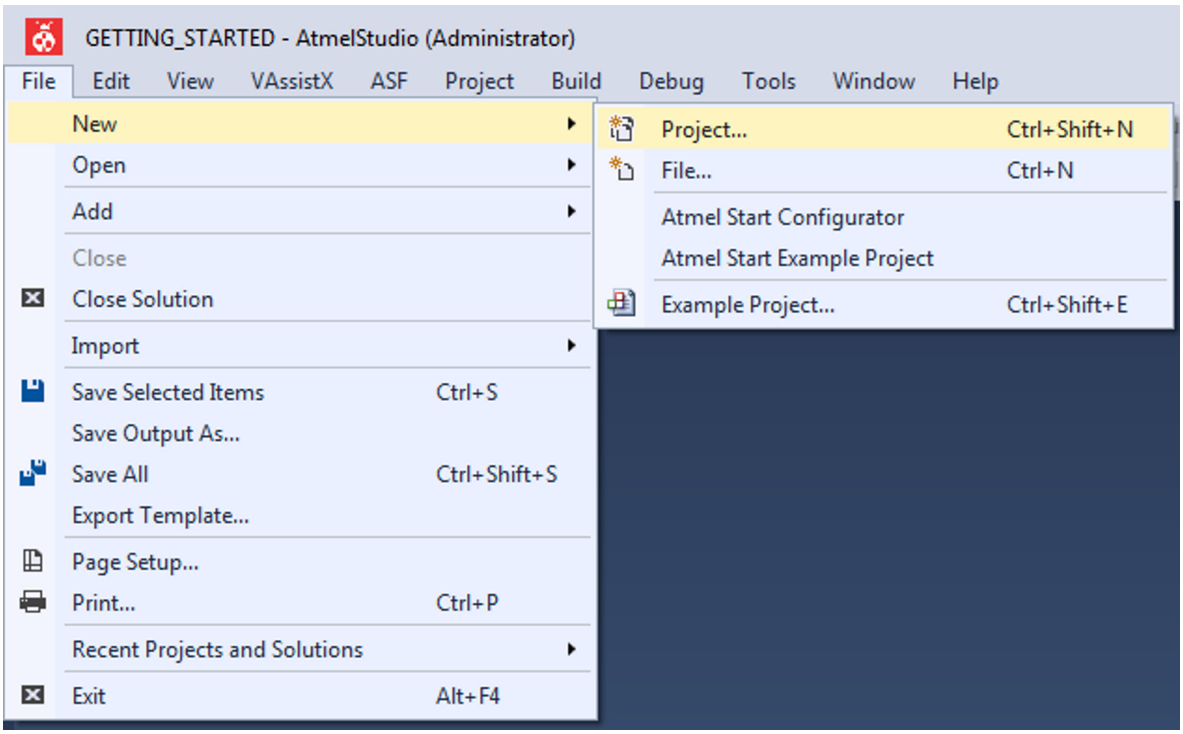
Work flow:

1. Launch Atmel Studio 7.0.
2. The page shown in the figure below will appear when ATtiny817 Xplained Mini is connected to Atmel Studio 7.0.

Figure 4-1. ATtiny817 Xplained Mini Page in Atmel Studio

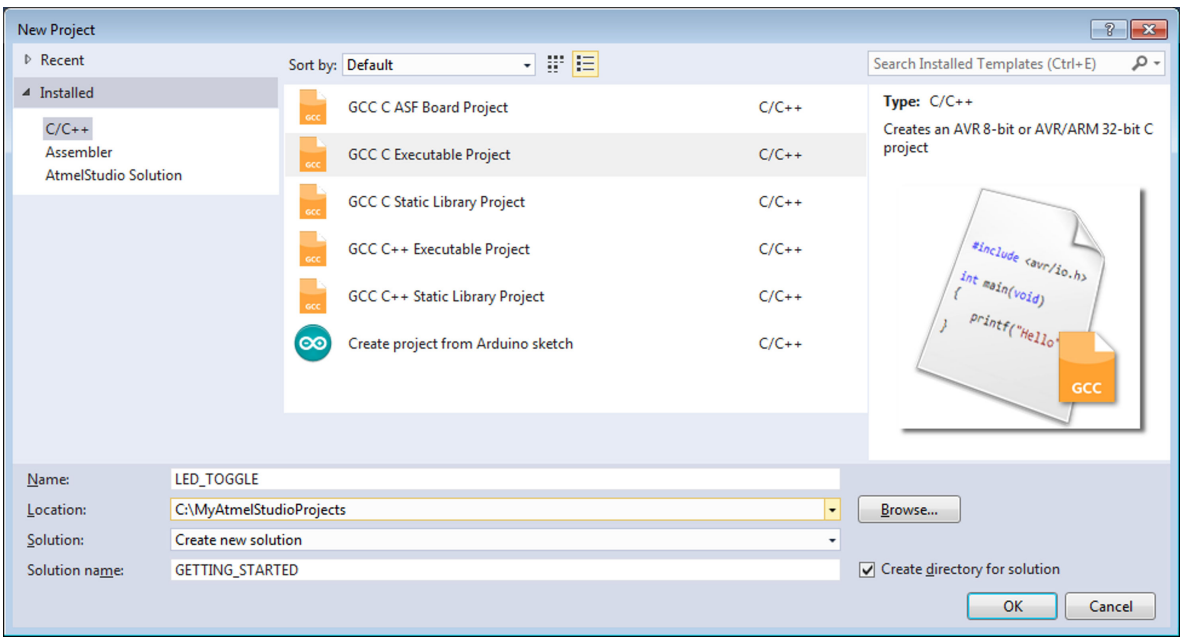
3. Start creating a new project by clicking "New → Project..." (or shortcut "Ctrl+Shift+N"), as shown in the figure below.

Figure 4-2. Create New Project in Atmel Studio



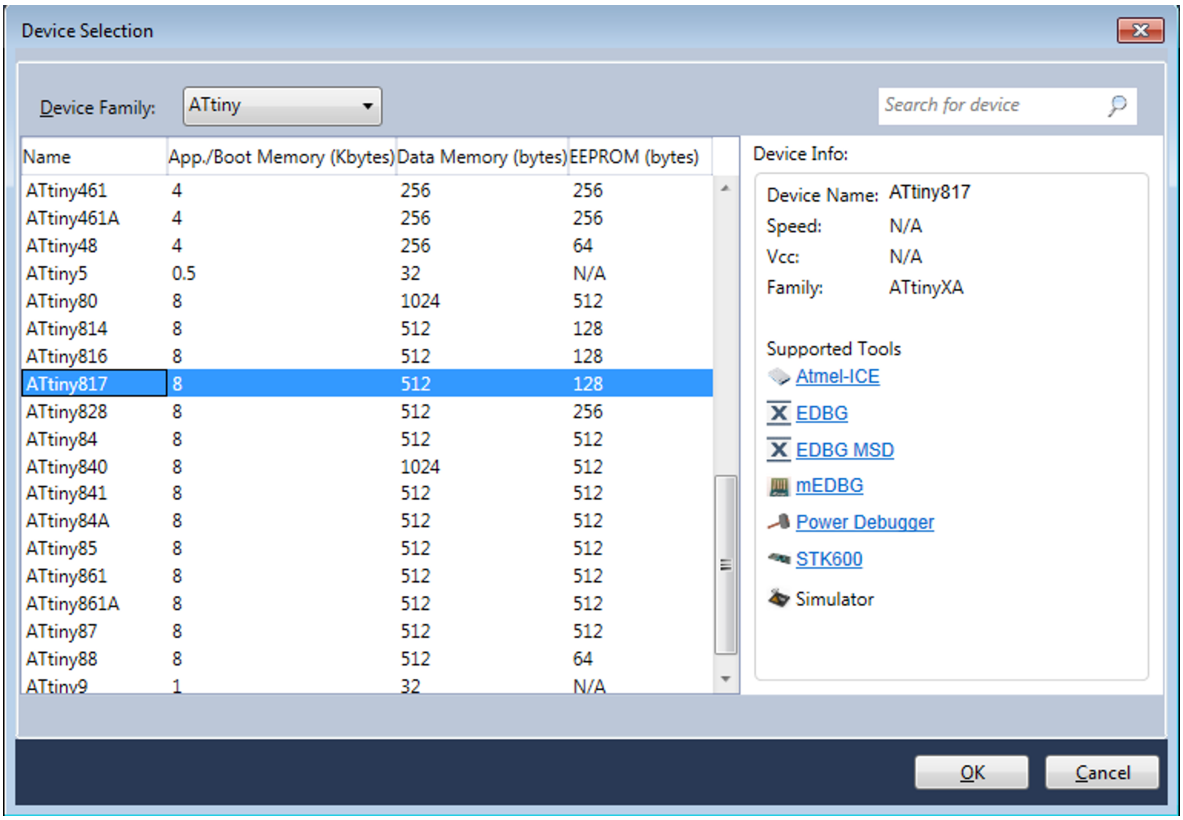
4. Select the "GCC C Executable Project" template from the new project wizard shown in the figure below, type in the name of the solution and project (e.g. "GETTING_STARTED" and "LED_TOGGLE"), and click "OK".

Figure 4-3. New Project Wizard



5. Select ATtiny817 from the device selection wizard as shown in the figure below, and click "OK".

Figure 4-4. Device Selection Wizard



A new project with a `main.c` file associated with it, will be generated in Atmel Studio.

6. Replace the `main` loop in the `main.c` file with the following code snippet:

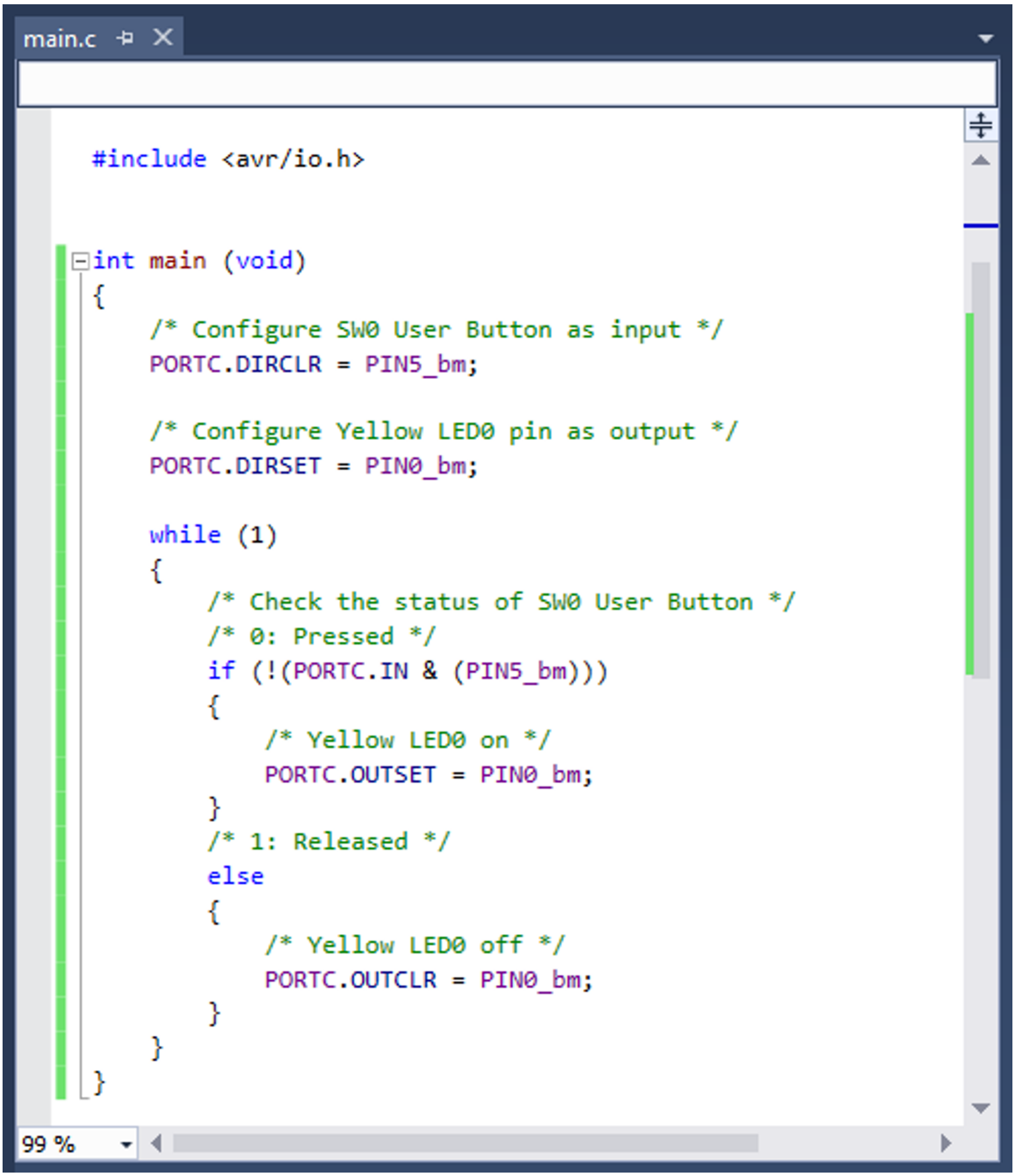
```
int main (void)
{
  /* Configure SW0 User Button as input */
  PORTC.DIRCLR = PIN5_bm;

  /* Configure Yellow LED0 pin as output */
  PORTC.DIRSET = PIN0_bm;

  while (1)
  {
    /* Check the status of SW0 User Button */
    /* 0: Pressed */
    if (!(PORTC.IN & (PIN5_bm)))
    {
      /* Yellow LED0  on */
      PORTC.OUTSET = PIN0_bm;
    }
    /* 1: Released */
    else
    {
      /* Yellow LED0 off */
      PORTC.OUTCLR = PIN0_bm;
    }
  }
}
```

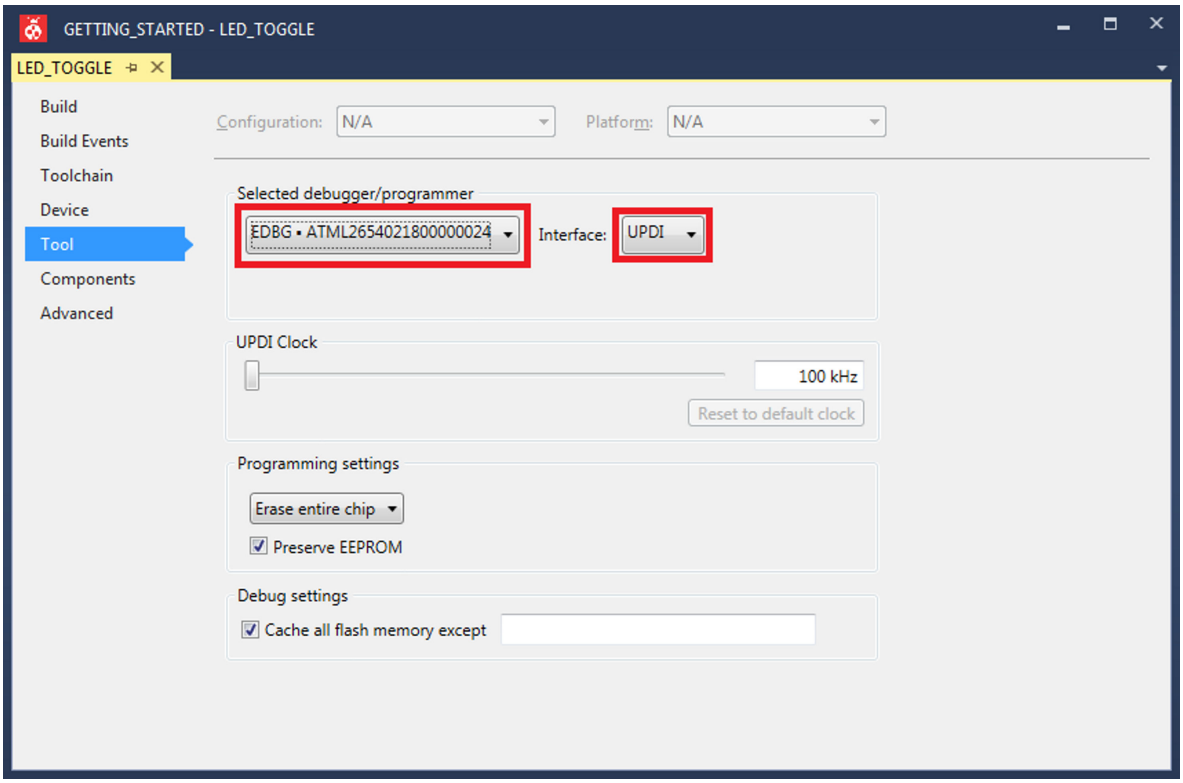
In the code editor, the code should appear as shown in the figure below.

Figure 4-5. Code Editor Window



7. Open project properties ("Project → Properties" or shortcut "ALT+F7").
8. In Tool view, see the figure below, set "Selected debugger/programmer" to mEDBG and "Interface" to UPDI.

Figure 4-6. Debugger and Interface for ATtiny817



9. Build the project ("Build → Build Solution" or shortcut "F7").
10. Load the code onto the ATtiny817 Xplained Mini and start debugging ("Debug → Start debugging and break" or shortcut "ALT+F5"). The application is programmed onto the device and program execution should break in main.
11. Run the code ("Debug → Continue" or shortcut "F5").
12. Verify that Yellow LED0 is lit when SW0 User Button is pushed on ATtiny817 Xplained Mini.

5. What's Next

For further information on related AVR products and IDE, refer to the links below:

Software:

- Atmel Studio videos: http://www.atmel.com/Microsite/atmel-studio/default.aspx
- Atmel Studio help: "Help → View Help" (shortcut "CTRL+F1")
- Atmel Gallery: https://gallery.atmel.com/

Firmware:

- Atmel START documentation: http://start.atmel.com/static/help/index.html
- Atmel START examples: http://start.atmel.com/#examples

Hardware:

- AVR042: AVR Hardware Design Considerations: http://www.atmel.com/images/atmel-2521-avr-hardware-design-considerations_applicationnote_avr042.pdf
- AVR IBIS files: http://www.atmel.com/tools/AVRIBISFILES.aspx
- AVR BDSL files: http://www.atmel.com/tools/AVRBSDLFILES.aspx

Recommended programming/debugging tools:

- Atmel-ICE:
  - Documentation: http://www.atmel.com/webdoc/GUID-DDB0017E-84E3-4E77-AAE9-7AC4290E5E8B/index.html
  - Buy: http://www.atmel.com/tools/atatmel-ice.aspx#buy
- Power debugger:
  - Documentation: http://www.atmel.com/webdoc/GUID-EAD481FD-28E6-4CD5-87FB-5165E7687C12/index.html
  - Buy: http://www.atmel.com/tools/atpowerdebugger.aspx#buy

Other:

- AVR Freaks®: http://www.avrfreaks.net/
- Application notes: http://www.atmel.com/products/microcontrollers/avr/tinyavr.aspx?tab=documents, select "Application Notes" from drop-down menu
- More technical documentation concerning various products: http://www.atmel.com/webdoc/
- Atmel Technical Support: http://www.atmel.com/design-support/

6. Revision History

Doc. Rev.	Date	Comments
42781A	09/2016	Initial document release

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