AVR 8-bit Microcontrollers

Atmel

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.



ATtiny817 Xplained Mini - 03	87 += × 👻
MCU board	ATtiny 917 Valained Mini
ATtiny817 Xplained Mini	ATUNY817 Xplained Mini
Extension	
	The Atmel ATtiny817 Xplained Mini evaluation kit is a hardware platform to evaluate the Atmel ATtiny817 microcontroller. Supported by the Atmel Studio integrated development platform, the kit provides easy access to the features of the Atmel ATtiny817 and explains how to integrate the device in a customer design.
	New ASF Example Project
	Launch Data Visualizer
	Update Kit Information
	Atmel Studio Help:
	Ø Kit Userguide
	External Links:
	Technical Documentation
	ATtiny817 Device Datasheet
	Xplained Pro Hardware Development Kit (HDK) User Guide
	✓ Kit Details
👿 Show page on connect	

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.



ŏ	GETTING_STARTED - AtmelStudio (Administrator)											
File	Edit	View	VAssistX	ASF	Project	Build		ebug	Tools	Window	Help	
	New					•	わ	Projec	t			Ctrl+Shift+N
	Open					•	*ъ	File				Ctrl+N
	Add					•		Atmel	Start Cor	figurator		
	Close							Atmel	Start Exar	mple Project	:	
×	Close So	olution					≞	Examp	le Project	t		Ctrl+Shift+E
	Import					<u> </u>						
•	Save Sel	ected Ite	ms		Ctrl+S							
	Save Ou	tput As										
ъ ⁸	Save All				Ctrl+Shift	+S						
	Export T	emplate										
₽	Page Set	tup										
•	Print				Ctrl+P							
	Recent P	Projects a	and Solution	s		•						
×	Exit				Alt+F4							

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

New Project						? 💌	
▷ Recent		Sort by:	Default -			Search Installed Templates (Ctrl+E)	
▲ Installed	stalled		GCC C ASF Board Project		C/C++	Type: C/C++	
Assembler AtmelStudio Solutio	on		GCC C Executable Project		C/C++	project	
		600	GCC C Static Library Project		C/C++		
		600	GCC C++ Executable Project	:	C/C++	#include <avr io.h<="" td=""></avr>	
		GCC	GCC C++ Static Library Proje	ary Project C/C++ Arduino sketch C/C++		(Printer	
		0	Create project from Arduino			GCC	
<u>N</u> ame:	LED_TOGGLE						
Location:	C:\MyAtmelStud	lioProject	s	<u>B</u> rowse			
Solution:	Create new solut	ion			•		
Solution name:	GETTING_START	ED			Create directory for solution		
						OK Cancel	

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



Figure 4-4. Device Selection Wizard

Device Selection							
Device Family:	ATtiny -					Search for device	٩
Name	App./Boot Memory (Kbytes)Data Memory (bytes)EEPROM (bytes)		Device Info:		
ATtiny461 ATtiny461A ATtiny461A ATtiny48 ATtiny5 ATtiny80 ATtiny814 ATtiny816 ATtiny816 ATtiny84 ATtiny84 ATtiny840 ATtiny841 ATtiny84A ATtiny85 ATtiny861 ATtiny861A ATtiny87 ATtiny88 ATtiny88 ATtiny88	4 4 0.5 8 8 8 8 8 8 8 8 8 8 8 8 8	256 256 256 32 1024 512 512 512 512 512 512 512 512 512 512	256 256 64 N/A 512 128 128 128 256 512 512 512 512 512 512 512 512 512 512		Device Name: Speed: Vcc: Family: Supported To Atmel-ICE EDBG EDBG MS EDBG MS EDBG MS EDBG MS MEDBG Power De STK600 Simulator	ATtiny817 N/A ATtinyXA ols <u>SD</u> bugger	
						<u>о</u> к	<u>C</u> ancel

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 SWO User Button as input */
PORTC.DIRCLR = PIN5_bm;
  /* Configure Yellow LED0 pin as output */
PORTC.DIRSET = PIN0 bm;
  while (1)
  {
    /* Check the status of SWO 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

main.c 🕫 🗙	•
<pre>#include <avr io.h=""></avr></pre>	÷ ▲
⊡int main (void) {	
<pre>/* Configure SW0 User Button as input */ PORTC.DIRCLR = PIN5_bm;</pre>	
<pre>/* Configure Yellow LED0 pin as output */ PORTC.DIRSET = PIN0_bm;</pre>	
while (1) {	
<pre>/* Check the status of SW0 User Button */ /* 0: Pressed */ if (!(PORTC_TN & (PIN5_bm)))</pre>	
{	
<pre>PORTC.OUTSET = PIN0_bm; } /* 1: Released */</pre>	
else {	
<pre>/* Yellow LED0 off */ PORTC.OUTCLR = PIN0_bm; }</pre>	
99 % - 4	Ť

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



GETTING_STARTED	D - LED_TOGGLE	 × ×
Build Build Events	<u>C</u> onfiguration: N/A Platfor <u>m</u> : N/A	
Toolchain Device Tool Components	Selected debugger/programmer EDBG • ATML2654021800000024 Interface:	
Advanced	UPDI Clock 100 kHz Reset to default clock	
	Programming settings Erase entire chip Preserve EEPROM	
	Debug settings Image: Cache all flash memory except	

Figure 4-6. Debugger and Interface for ATtiny817

- 9. Build the project ("Build \rightarrow 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 \rightarrow 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 \rightarrow 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-avrhardware-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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