



[Main Page](#)  
[All pages](#)  
[All categories](#)  
[Recent changes](#)  
[Random page](#)  
[Help](#)

Toolbox

[What links here](#)  
[Related changes](#)  
[Special pages](#)  
[Printable version](#)  
[Permanent link](#)  
[Page information](#)

**NOTICE: The Processors Wiki will End-of-Life in December of 2020. It is recommended to download any files or other content you may need that are hosted on [processors.wiki.ti.com](http://processors.wiki.ti.com). The site is now set to read only.**

# Getting Started with the TIVA™ C Series TM4C123G LaunchPad

Version 1.22 November 2013 Labs are based on CCS 5.5 and TivaWare 1.1

## Contents [\[hide\]](#)

- 1 [Preface](#)
- 2 [Introduction](#)
  - 2.1 [Chapter 10 BoosterPacks and the Graphics Library](#)
  - 2.2 [Chapter 11 Synchronous Serial Interface](#)
  - 2.3 [Chapter 14 Sensor Hub](#)
  - 2.4 [Chapter 15 PWM](#)
- 3 [Attend a Live Workshop](#)
- 4 [Hardware Requirements](#)
- 5 [Software Requirements](#)
- 6 [Workshop Material](#)
- 7 [Videos](#)

## Preface

The intent of this workshop is to be a place where a person with a few C skills and some microcontroller experience can familiarize themselves with the Tiva C Series parts, Code Composer Studio, TivaWare for C Series and the process of programming these microcontrollers. If you lack C programming skills, there are many courses on the Internet where you can gain them ... that knowledge can form the basis for a rewarding career.

If you are migrating from earlier Stellaris devices, please refer to [this](#) [document](#) for more information.

**The labs in this workshop (with the exception of Chapter 15's PWM lab) will also work perfectly well on the Stellaris LM4F120 LaunchPad ... no changes are required.**

## Introduction

The **Getting Started with the TIVA C Series TM4C123G LaunchPad Workshop** is an in-depth, hands-on introduction into Tiva C Series basics including:

1. **Introduction to the ARM® Cortex™-M4F and Peripherals**
2. **Introduction to Code Composer Studio**
3. **TivaWare, Initialization and GPIO**

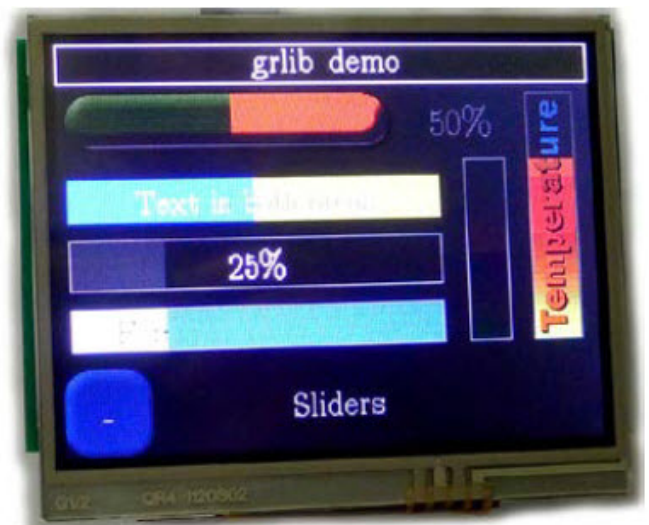
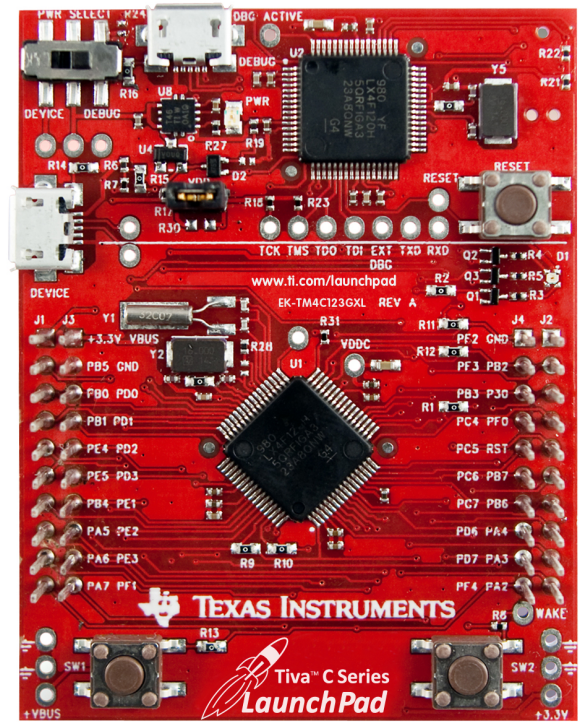
4. Interrupts and the Timers
5. ADC12
6. The Hibernation Module
7. USB
8. Memory and Security
9. The Floating-Point Unit
10. BoosterPacks and the Graphics Library
11. Synchronous Serial Interface
12. UART
13. uDMA
14. Sensor Hub
15. PWM

Each of these sections includes an in-depth lab that will step you through the usage, programming and testing of the peripheral(s) or tool(s) covered.

The workshop is based on the low cost, expandable Tiva TM4C123G LaunchPad Evaluation Kit[1]. The LaunchPad board features an 80MHz TM4C123GH6PM microcontroller, on-board emulation and BoosterPack XL format expansion pins. The TM4C123GH6PM microcontroller has 256KB of flash memory, 32KB of RAM, 2KB of EEPROM, two 12-bit analog to digital converters, a USB 2.0 OTG/H/D port, a hibernation module, motion control, other serial connectivity and flexible GPIO.

TI's Tiva C Series devices[2] are supported by several Integrated Development Environments: Mentor Graphics® Mentor Embedded IDE[3], IAR Systems Embedded Workbench[4], ARM®'s Keil™ microVision IDE[5] and Texas Instrument®'s Eclipse-based Code Composer Studio™[6]. The workshop labs are based on Code Composer Studio, which is free and fully functional when connected to the LaunchPad board.

The workshop labs are constructed using TivaWare™[7]. TivaWare is an extensive suite of license and royalty-free software designed to simplify and speed development of Tiva C Series based microcontroller applications. TivaWare includes the Peripheral Driver Library and the Graphics Library. The Peripheral Driver library is a set of functions for controlling the peripherals found on the Tiva C Series family of ARM Cortex-M microcontrollers. All TM4C devices provide this code in on-board ROM. The TivaWare Graphics Library is a set of graphics primitives and widgets for creating graphical user interfaces on TIVA C Series microcontroller-based boards that have a graphical display.



## Chapter 10 BoosterPacks and the Graphics Library

Expandability of the LaunchPad board is accomplished through its BoosterPack XL connectors. These connectors are backwards compatible with the original BoosterPack connectors. There are many BoosterPacks available through TI and third parties. In order to highlight the expansion capabilities of the TM4C123G LaunchPad board and the use of the graphics library, the workshop includes the Kentec Display 3.5" LCD TouchScreen BoosterPack[8]. You can purchase the BoosterPack directly from the [manufacturer](#) or through [Newark](#) Electronics. If you can't find Kentec Display you can also buy LCDBPV2.

### LCDBPV2: 3,2" Touch LCD boosterpack

Here is the Touch LCD Boosterpack for Tiva, Stellaris and Hercules Launchpad. It works with Texas Instruments Graphics Library and uses SSD1289 LCD Driver for 3,2" 320x240 Screen and analog signals for Touch (TI Graphics Library uses analog signals). The interface is hi speed 16bit color parallel. Also, you can use [EHA](#) protocol to control it only through 4 wire bus.

You can find example codes and buy it on [danirebollo.es website](#)

Info: Texas Instruments Graphics Library: [http://www.ti.com/tool/sw-tm4c-grl?](http://www.ti.com/tool/sw-tm4c-grl?sectionId=625&tabId=2495&familyId=1755)

[SSD1289 LCD Driver:](#)

<https://docs.google.com/file/d/0BzJpWEe1yMQvMVpEZm1DNVpLR2s/edit?usp=sharing> and

<https://docs.google.com/file/d/0BzJpWEe1yMQvR2c5ZEJIU1NhX1E/edit>

[Video](#)

## Chapter 11 Synchronous Serial Interface

Chapter 11 of the workshop covers the Synchronous Serial Interface. In order to run the lab you will need to purchase and modify an [Olimex 8x8 LED BoosterPack](#). These boards are available through [Mouser Electronics](#). Complete instructions on the needed modifications are in the chapter 11 lab. If you are attending a live workshop, boards will be available for your use.

[Video](#)

## Chapter 14 Sensor Hub

Chapter 14 of the workshop covers the Tiva Sensor Hub. To complete labs 14a and 14b you will need a BOOSTXL-SENSHUB Sensor Hub Boosterpack. If you are attending a live workshop, the instructor will have several for attendees to use. Otherwise you will need to purchase one: [\[9\]](#)

[Video](#)

## Chapter 15 PWM

Chapter 15 of the workshop covers the PWM module. To complete lab 15 you will need a hobby-type servo. If you are attending a live workshop, the instructor will have several for attendees to use. Otherwise you will need to purchase one: [\[10\]](#)

[Video](#)

## Attend a Live Workshop

---

You can attend a live version of this workshop taught by an experienced Texas Instruments instructor. Sign up [here](#).

## Hardware Requirements

---

To run the labs, you will need the following:

- A 32 or 64-bit Windows XP, Windows 7 or Windows 8 laptop with 2G or more of free hard drive space. 1G of RAM should be considered a minimum ... more is better.
- A laptop with Wi-Fi is highly desirable
- If you are working the labs from home, a second monitor will make the process much easier. If you are attending a live workshop, you are welcome to bring one.
- If you are attending a live workshop, please bring a set of earphones or ear-buds.
- If you are attending a live workshop, you will receive an evaluation board; otherwise you need to purchase one. [\[11\]](#)
- If you are attending a live workshop, a digital multi-meter will be provided; otherwise you need to purchase one like the inexpensive version here [\[12\]](#)
- If you are attending a live workshop, you will receive a second A-male to micro-B-male USB cable. Otherwise, you will need to provide your own to complete Lab 7.
- If you are attending a live workshop, you will receive a Kentec 3.5" TFT LCD Touch Screen [BoosterPack](#) (Part# EB-LM4F120-L35). Otherwise, you will need to provide your own to complete Lab 10. You can purchase the BoosterPack directly from the [manufacturer](#) or through [Newark Electronics](#).
- If you are attending a live workshop, Olimex 8x8 LED BoosterPacks will be available for use with both modifications. If you want to run this lab from home you will need to obtain and modify the board as detailed in the chapter 11 lab.
- If you are attending a live workshop, Sensor Hub BoosterPacks will be available for use. If you want to run this lab from home you will need to obtain one. [\[13\]](#)
- If you are attending a live workshop, modified servos will be available for use. If you want to run this lab from home you will need to obtain one like this: [\[14\]](#)

## Software Requirements

---

To run the labs, you will need the following:

- Code Composer Studio 5.4 or later [\[15\]](#)
- TivaWare for C Series [\[16\]](#)
- The LM Flash Programmer [\[17\]](#)
- The lab installation file found in the Workshop Materials section
- The workshop workbook file found in the Workshop Materials section.
- A terminal program like HyperTerminal (WinXP) or PuTTY [\[18\]](#)
- The Windows side USB examples [\[19\]](#)
- GIMP image manipulation tool [\[20\]](#)

**Complete instructions for downloading and installing this software is in Chapter 1 of the workbook found in the Workshop materials section**

## Workshop Material

---

- The [workbook](#) pdf file

- The labs [installation](#) file (if this file downloads without the exe filename extension, please rename the file to add it)
- The zipped PowerPoint [presentation](#)
- The [Word doc](#) files used to create the workbook
- The [installation guide](#) for workshop attendees

## Videos

---

[Chapter One](#) - Introduction to ARM Cortex-M4F and Peripherals

[Lab One](#)

[Chapter Two](#) - Code Composer Studio

[Chapter Three](#) - Introduction to TivaWare, Initialization and the GPIO

[Chapter Four](#) - Interrupts and the Timers

[Chapter Five](#) - ADC12

[Chapter Six](#) - Hibernation Module

[Chapter Seven](#) - USB

[Chapter Eight](#) - Memory

[Chapter Nine](#) - Floating-Point

[Chapter Ten](#) - Boosterpacks and grLib

[Chapter Eleven](#) - Synchronous Serial Interface

[Chapter Twelve](#) - UART

[Chapter Thirteen](#) - uDMA

[Chapter Fourteen](#) - Sensor Hub

[Chapter Fifteen](#) - PWM

This page was last edited on 9 January 2015, at 09:41.

Content is available under [Creative Commons Attribution-ShareAlike](#) unless otherwise noted.

[Privacy policy](#) [About Texas Instruments Wiki](#) [Disclaimers](#) [Terms of Use](#)

