Introduction
The TM4C123x MCUs provide a broad portfolio of connected Cortex®-M4 microcontrollers. Designers who migrate to the TM4C123x MCUs benefit from a balance between the floating-point performance needed to create highly responsive mixed-signal applications and the low-power architecture required to enable increasingly aggressive power budgets. TM4C123x MCUs are supported by TivaWare™ for C Series software, designed specifically for those customers who want to get started easily, write production-ready code quickly, and minimize their overall cost of software ownership.

Key highlights
• ARM Cortex-M4 core with floating point
• CPU speed up to 80 MHz
• Up to 256-KB Flash
• Up to 32-KB single-cycle SRAM and 2-KB EEPROM
• Two high-speed 12-bit ADCs up to 1 MSPS
• Up to two CAN 2.0 A/B controllers
• Optional full-speed USB 2.0 OTG/Host/Device
• Up to 40 PWM outputs
• Serial communication with up to: 8 UARTs, 6 I2Cs, 4 SPI/SSI
• Intelligent low-power design power consumption as low as 1.6 µA

Benefits
• 12-bit ADC accuracy achievable at the full 1 MSPS rating without any hardware averaging, eliminating performance tradeoffs
• First ARM Cortex-M MCU in advanced 65-nm process technology provides the right balance between higher performance and low power consumption
• ARM Cortex-M4 with floating point accelerates math-intensive operations and simplifies digital signal processing implementations
• Range of pin-compatible memory and package configurations enables optimal selection of devices

Applications
• Connectivity
• Sensor aggregation
• Security and access control
• Home and building automation
• Industrial automation
• Human machine interface
• Lighting control
• Energy
• Data acquisition
• System management
Introduction

The **TM4C129x** product line will allow designers to develop a new class of highly connected products using the first ARM® Cortex®-M4 MCU with integrated Ethernet MAC+PHY, along with on-chip communication peripherals. Engineers will have the ability to enhance product features and communicate to industrial and HMI applications with integrated data protection, robust memory and LCD controller. They can further control and differentiate products with TivaWare™, including 50+ software application examples, along with TI’s strong development ecosystem.

### Key highlights
- ARM Cortex-M4 core with floating point
- CPU speed up to 120 MHz
- Up to 1-MB Flash
- 256-KB SRAM and 6-KB EEPROM
- 10/100 Ethernet with embedded MAC and PHY
- LCD controller
- AES, DES, SHA/MD5 and CRC hardware acceleration
- Four tamper inputs
- Two 12-bit ADCs up to 2 MSPS
- Two CAN 2.0 A/B controllers
- Full-speed USB 2.0 OTG/Host/Device and high-speed USB ULPI interface
- Serial communication with up to:
  - 8 UARTs, 10 I2C, 4 QSPI/SSI, 1-Wire master interface

### Benefits
- Connect to and communicate with products and services with 10/100 Ethernet MAC+PHY with advanced line diagnostics. Integrated CAN and USB provide high-speed connectivity, allowing the creation of seamless gateway solutions.
- Control outputs and manage multiple events with 10 I2C ports, dual 12-bit ADCs, three on-chip comparators, and the external peripheral interface
- Address varying application memory needs with pin-for-pin compatibility across the TM4C129x portfolio. With 256 KB of integrated SRAM and 6-KB EEPROM along with a scalable 512 KB to 1 MB Flash memory with 100,000 program cycle endurance for extended in-field updates and reliable operation.
- Save board space and design smaller products with integrated Ethernet MAC+PHY, USB and LCD controller.
- Add data protection to applications and reduce processing overhead with the hardware acceleration of key encryption/decryption

### Applications
- Solar inverters
- Industrial sensors
- Industrial automation
- Security access systems
- Industrial motor control
- Communications adapters/concentrators
- Networked industrial meters/controllers
- Industrial HMI control panels/displays
- Networked residential/SoHo systems
- Vending machines
Hibernate mode, a CAN transceiver, a temperature sensor, a nine-axis sensor for motion tracking and easy-access through-holes to all of the available device signals.

**TM4C129x Connected Development Kit** (DK-TM4C129X) is a versatile and feature-rich engineering platform highlighting the 120-MHz TM4C129XNCZAD ARM Cortex-M4-based microcontroller that includes an integrated 10/100 Ethernet MAC+PHY plus many other key features. Beyond the industry-leading Ethernet integration, this kit and its associated MCU, the TM4C129XNCZADI, also showcase integrated functions such as a color LCD interface, USB 2.0 OTG/Host/Device port, TI wireless EM connection, BoosterPack and BoosterPack XL interfaces, a Quad SSI-supported 512-Mbit Flash memory, microSD slot, plus expansion headers providing easy access for interfacing to the MCU’s high-speed USB ULPI port, Ethernet RMII/MII ports, and its external peripheral interface, which supports memories, parallel peripherals and other system functions.

**Evaluation kits**

**EK-TM4C123GXL LaunchPad** is the perfect kit to get started with a TM4C microcontroller (MCU) at just $12.99.

**EK-TM4C1294XL Connected**

LaunchPad is the industry’s lowest-priced Cortex®-M4 evaluation kit with one-of-a-kind out-of-the-box connectivity options, starting at $19.99.

[www.ti.com/launchpad](http://www.ti.com/launchpad)

**Development kits**

**TM4C123G Development Kit** is a compact and versatile evaluation platform for the TM4C123G ARM® Cortex-M4-based microcontroller (MCU). The development kit design highlights the TM4C123G MCU integrated USB 2.0 On-the-Go/Host/Device interface, CAN, precision analog, sensor hub, and low-power capabilities. The development kit features a TM4C123GH6PGE microcontroller in a 144-LQFP package, a color OLED display, USB OTG connector, a microSD card slot, a coin-cell battery for the low-power

**Plug-in BoosterPacks for the TM4C123x LaunchPad and TM4C129x Connected Development Kit** make it simple and fun to explore various applications by expanding the functionality of the TM4C MCUs.

[www.ti.com/boosterpack](http://www.ti.com/boosterpack)

**BoosterPacks**

**Sensor Hub BoosterPack.** Unlock a world of possibilities with TI’s new Sensor Hub BoosterPack featuring 9-axis MEMS motion sensors, pressure sensor, ambient light sensor and IR temperature sensor.
## TM4C123x/TM4C129x Microcontrollers

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Core</th>
<th>External I/Fs</th>
<th>Serial Interfaces</th>
<th>Timers</th>
<th>Analog</th>
<th>Data Protection</th>
<th>Low Pwr</th>
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**Texas Instruments**

**TM4C Microcontrollers • 2014 | 5**
## TM4C123x/TM4C129x Microcontrollers

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### Package options

- **157-ball BGA**
- **212-ball BGA**
- **64-pin LQFP**
- **100-pin LQFP**
- **128-pin TQFP**
- **144-pin LQFP**
TivaWare™ Software for C Series provides free-license and royalty-free source code that customers can use to accelerate their time to market and reduce their total cost of software ownership.

<table>
<thead>
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<th>Libraries and code examples</th>
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<tr>
<td>Use the TivaWare for C Series software libraries and start spending your time differentiating your solution!</td>
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**Peripheral driver library**
Set of BSD licensed functions for controlling TM4C peripherals.

**Graphics library**
Royalty-free set of graphics primitives and widgets to create GUIs.

**CMSIS DSP library**
Full support for ARM®'s Cortex® Microcontroller Software Interface Standard (CMSIS) libraries.

**USB library**
TivaWare royalty-free USB stack is provided to enable efficient USB host, device, and on-the-go operations.

**Sensor Hub library**
TM4C Sensor Hub library offers an advanced sensor fusion algorithm and a broad range of sensor support.

**Ethernet**
Integrated Ethernet MAC+PHY with support with lwIP, MuIP and TI’s Networking Development Kit (NDK).

**Interactive Development Environment (IDE)**

TivaWare Software for C Series is pre-built using five different compilers.

Code Composer Studio™ (CCStudio) is an integrated development environment (IDE) for all of Texas Instruments embedded processor families.
In-System Programming Support

- Boot loaders available in on-chip ROM
- Boot loader customized in Flash memory
- Serial Flash loader

Download: www.ti.com/tool/lmflashprogrammer

PinMux Utility

- Easy-to-use tool for configuring the GPIOs
- Generates source code in C
- Automatically checks and solves pin conflicts
- Intuitive user interface
- Provided free of charge

Real-Time Operating System (RTOS)

TI WorldWide Technical Support

Internet

TI Semiconductor Product Information Center Home Page
support.ti.com

TI E2E™ Community Home Page
e2e.ti.com

Product Information Centers

America Phone +1(512) 434-1560
Brazil Phone 0800-891-2616
Mexico Phone 0800-670-7544
Fax Internet/Email +1(972) 927-6377
support.ti.com/sc/pic/americas.htm

Europe, Middle East, and Africa

Phone

European Free Call 00800-ASK-TEXAS
(00800 275 83927)
International +49 (0) 8161 80 2121
Russian Support +7 (495) 98 10 701

Note: The European Free Call (Toll Free) number is not active in all countries. If you have technical difficulty calling the free call number, please use the international number above.

Fax

Internet www.ti.com/asktexas
Direct Email asktexas@ti.com

Asia Phone Toll-Free Number

Note: Toll-free numbers may not support mobile and IP phones.

Australia 1-800-999-084
China 800-820-8682
Hong Kong 800-96-6941
India 000-800-100-8888
Indonesia 001-803-8861-1006
Korea 080-551-2804
Malaysia 1-800-80-3973
New Zealand 0800-46-934
Philippines 1-800-765-7404
Singapore 800-886-1028
Taiwan 0800-006800
Thailand 01-800-886-0010
International +86-21-23073444
Fax +86-21-23073686
Email tiasia@ti.com or ti-china@ti.com
Internet support.ti.com/sc/pic/asia.htm

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