*WHITE PAPER*

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# TEXAS INSTRUMENTS

# *MSP430 Value Line LaunchPad Development Kit*

## *Introduction*

*As applications continue to advance, 8-bit microcontrollers are struggling to meet the growing demand for higher performance and ultra-low power to support evolving product designs. Texas Instruments introduced the affordable 16-bit MSP430™ MCU Value Line to meet the changing market dynamics and requirements faced by typical low-cost 8-bit MCU developers. Taking the next step in providing a low-cost solution to the shortcomings of 8-bit MCUs, TI created the MSP430 MCU Value Line LaunchPad development kit to jump start application designs and provide a low-cost tool for developers of all experience levels. This overview will provide an introduction to the features and functionality of LaunchPad as well as everything included in the $4.30 kit.*

As the number of competitors grow and the time for taking products to market shrinks, the microcontroller (MCU) industry is being stretched by two opposing, but equally strong vectors. The growing demand for higher performance and ultra-low power functionality is matched only by an aggressive need for lower and lower price points. This is especially clear in low-cost applications that utilize 8-bit MCUs. To increase performance without breaking the bank, developers of low-cost 8-bit MCUs must migrate to higher performance 16-bit MCUs that are available at affordable price points.

In high volume and quick turnover markets such as consumer and personal electronics, the need for a highly differentiated MCU, while maintaining aggressive price points, is a constant struggle. For instance, the market for 3D glasses has exploded in the recent months, both on the big and small screen. As this market trend moves up and to the right, developers are hard at work in creating technological solutions that provide a unique and immersive experience while remaining affordable. By providing more affordable solutions, developers hope to minimize the risks and barriers associated with new and fast moving markets.

For many, this barrier to success is prohibited by a limited MCU core. Many developers of 8-bit MCUs have completely exhausted the full capabilities of their MCU due to limited data throughput and inefficient interfacing with higher resolution analog and digital peripherals. To enable increased functionality and improve feature sets of existing projects, developers must migrate to higher performance 16-bit MCUs.

The MSP430 MCU Value Line series provides a migration path for many of these constrained 8-bit MCU developers. At no additional cost, the affordable MSP430 MCU Value Line devices offer a 16-bit architecture, higher precision timers and improved peripheral integration and interfacing, enabling improved performance and lower power consumption. The implementation of 16-bit MCUs enable up to 10 times improved performance and 10 times lower power when compared to many low-cost 8-bit applications. Currently, the MSP430 MCU Value Line series offers 27 ultra-low power 16-bit devices that offer varying levels of analog integration, communication modules and package types. At 100K unit volumes, MSP430 MCU Value Line devices start at just $0.25 USD, ensuring that

developers do not have to sacrifice price for improved performance. Additionally, the MSP430 MCU Value Line series will continue to grow to more than 100 devices through the second half of 2011. This roadmap will introduce higher memory sizes, more package options and additional integrated analog and digital peripherals.

To make the transition from 8- to 16-bit MCUs more seamless, Texas Instruments (TI) listened to the requirements of developers and created the new MSP430 MCU Value Line LaunchPad development kit. Furthering the commitment to add performance and value to MCU designs with the MSP430 MCU Value Line, TI introduced LaunchPad to lower the barrier of entry for developers new to 16-bit architectures, or those new to MCU design, in general. The LaunchPad kit is TI's simple, yet thorough, introduction to 16-bit MCU development, offering all of the hardware and software a developer needs to get started for just $4.30 USD. Within minutes of opening the LaunchPad kit, users can begin interfacing with push buttons, LEDs and the on-chip peripherals of the MSP430 MCU Value Line devices. See Figure 1 below:
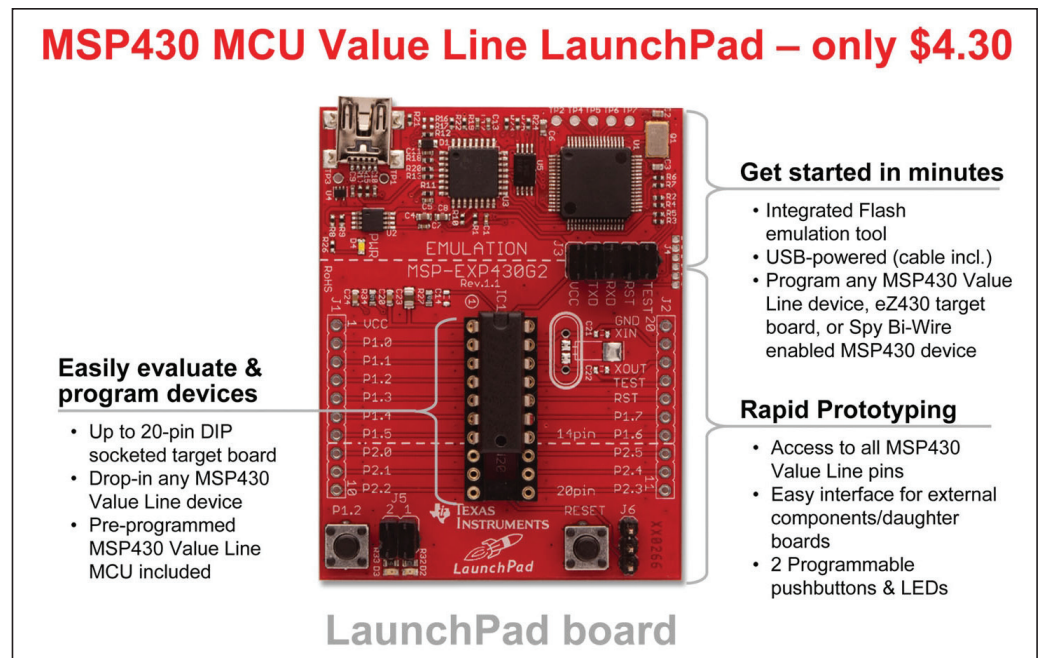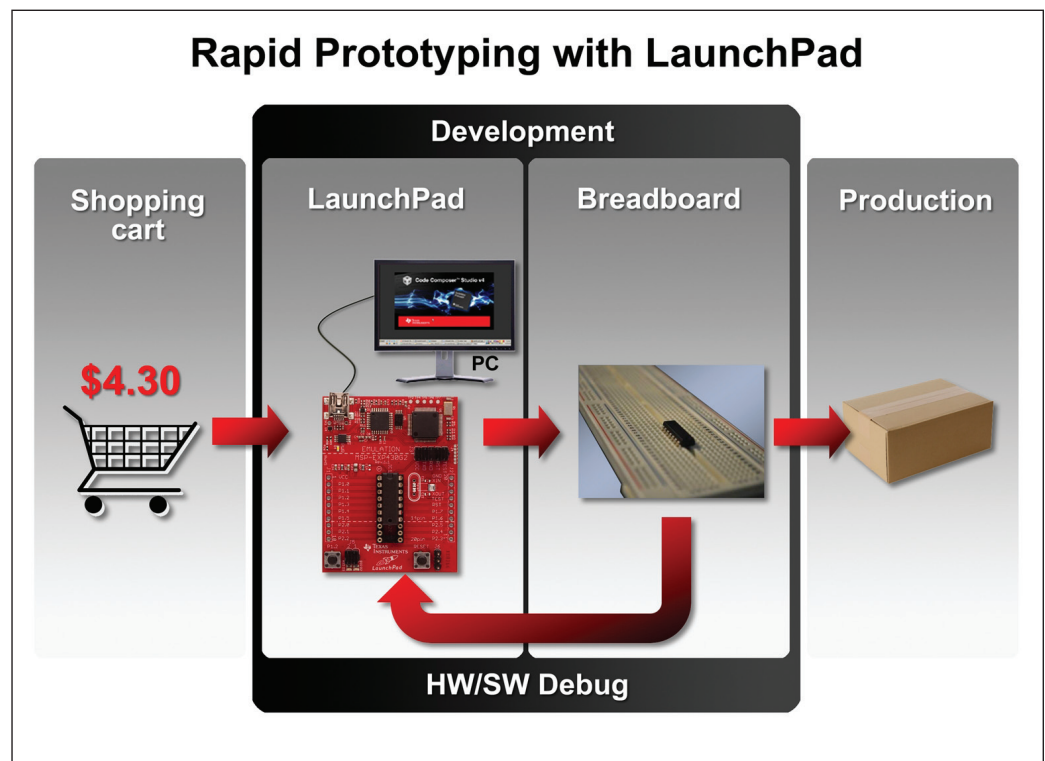


▲ *Figure 1.*

For just $4.30, the LaunchPad kit includes a development board with an integrated USB-powered flash emulation tool for programming and debugging any of the existing MSP430 MCU Value Line devices. Any MSP430G2xx MCU in a DIP package can be dropped into the DIP target socket of LaunchPad, which allows easy evaluation of any MSP430 MCU Value Line device. The flexible target socket allows developers to remove their freshly programmed and debugged MSP430G2xx MCU to be plugged into a custom breadboard or PCB so that customers are not constrained to the form factor of the LaunchPad board. Alternatively, developers can use LaunchPad as a standalone system, by leaving the MSP430G2xx device plugged into the board to leverage on-board and programmable push buttons and LEDs. Additionally, every pin of the MSP430G2xx device is fully accessible, allowing easy interfacing of external components or custom daughter cards.

Also provided in the kit are free, downloadable software compilers and debuggers including TI's own eclipse-based Code Composer Studio™ version 4 and IAR Embedded Workbench Kickstart. These independent development environments (IDEs) are full featured and are completely compatible with LaunchPad and the MSP430 MCU Value Line devices available today. This complements the hardware features of the LaunchPad board by providing a complete software component as well. Using either IDE, users can then leverage MSP430 MCU code examples, open source projects and other free online resources, which can be accessed on LaunchPad's Wiki page, **www.ti.com/launchpadwiki**.

The unlimited access to the LaunchPad Wiki promotes collaboration and simple sharing of solutions and ideas, making LaunchPad a complete development environment.  This active and growing online community supplements the hardware and software components of the LaunchPad package and provides instant support, projects and helpful hints that will be shared through the Wiki pages and E2E™ forums.

To fully benefit from 16-bit architecture and ultra-low power performance, the MSP430 MCU Value Line series and LaunchPad development kit offers a complete and simple introduction to quicken developers' time to market. By providing 16-bit performance at 8-bit price points, and complete development tools for just $4.30, TI would like to welcome both new and experienced users to the world of high performance and affordable MCU development.



▲ *Figure 2. $4.30 LaunchPad kit offers the hardware and software needed to start developing applications, and is backed by an active online community to quicken time to market.*

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