



# Fusion Starter Kit



THE ALL-INCLUSIVE, LOW COST EVALUATION KIT

FOR THE ACTEL FUSION™ FAMILY



The Actel Fusion Programmable System Chip (PSC) satisfies the demand from system architects for a device that simplifies design and unleashes their creativity. As the world's first mixed-signal FPGA family, Fusion integrates mixed-signal analog, up to 8 Mbits of Flash memory, and FPGA fabric in a monolithic PSC. The Actel Fusion devices enable designers to quickly move from concept to completed design and deliver feature-rich systems to market. This new technology takes advantage of the unique properties of Flash-based Actel FPGAs, including a high-isolation, triple-well process, and the ability to support high-voltage transistors to meet the demanding requirements of mixed-signal system design.

The Actel Fusion PSCs bring the benefits of programmable logic to the following application areas: power management, smart battery charging, clock generation and management, and motor control. Until now, these applications have only been served by either costly and space-consuming discrete analog components or mixed-signal ASIC solutions. The Actel Fusion PSCs present new capabilities for system development by allowing designers to integrate a wide range of functionality into a single device, while at the same time offering the flexibility of upgrades in the field or deep in the production cycle. The Actel Fusion devices provide an excellent alternative to costly and time-consuming mixed-signal ASIC design. In addition, when used in conjunction with a soft processor core, such as Actel Core8051, Actel Fusion devices represent the definitive soft MCU platform.

Flash-based Fusion devices are live at power-up. As soon as system power is applied and within normal operating specifications, Fusion devices are working. Fusion devices have a 128-bit Flash-based lock and industry-leading AES decryption, used to secure programmed intellectual property (IP) and configuration data. Actel Fusion devices are the most comprehensive single-chip analog and digital programmable logic solution available today.

### All-Inclusive and Low Cost

The low cost Fusion Starter Kit contains everything you need to start using the advanced features of the Actel Fusion family:

- Evaluation Board with an AFS600-FG256 Fusion Device
- Actel Libero® Integrated Design Environment (IDE) Gold
- FlashPro3 and Programming Cable
- Power Supply
- User's Guide Including Printed Circuit Board (PCB) Schematics
- Sample Design

### Fusion Evaluation Board

The Fusion evaluation board has on-board voltage regulation, enabling you to independently set the I/O voltages to 1.5 V or 3.3 V on each of two I/O banks. Two other I/O banks are fixed at 3.3 V. The remaining I/O bank is for high voltage analog I/Os that support direct connection to voltages ranging from -12 V to +12 V. These I/Os support current monitoring, temperature monitoring, and metal-oxide semiconductor field-effect transistor (MOSFET) driver outputs.

System clock generation, manipulation, and distribution are enabled with an on-chip 1% RC oscillator, a crystal oscillator circuit, and Phase-Locked Loops (PLLs). Eight LEDs and four switches provide simple inputs and outputs to the system. The Fusion Flash memory can support multiple functions, including state saving of volatile SRAM and registers prior to power-down, initialization of SRAM and registers at power-up, boot code store, and data logging. The on-board LCD can be used to display values of converted analog signals (voltage, current, or temperature) and Flash memory contents.

Prototyping headers connect to all the Fusion device pins, enabling you to add components to the evaluation board easily. The board is equipped with a prototyping area to enable design experimentation with the addition of components. External temperature sensors and current sensing circuitry for power control applications are provided.

The Fusion evaluation board features a high brightness, multi-color LED for illustrating temperature changes and pulse width modulation (PWM) fan control by varying the brightness of the LED. The board is also equipped with a 40-pin daughter card connector for use with system boards developed by Actel, customers, or third party partners, allowing users to easily and cost-effectively add functionality or connect to larger target systems. Two programming headers on the board support in-system programming (ISP) of single and JTAG-chained boards using FlashPro3.



### FlashPro3

FlashPro3 is a portable, low cost, USB 2.0, in-system programmer for Actel Fusion, ProASIC<sup>®</sup>3, and ProASIC3E devices. This programmer draws power from the USB connection rather than from an external power brick to create an extremely compact solution. The FlashPro3 ultra-small form factor, low cost, and easy to use software make in-system programming with Fusion devices a simple task. The fact that the same programmer can be used for both Fusion and ProASIC3/E silicon gives far greater flexibility to the end user and also further reduces system setup costs.



### Libero IDE

Actel Libero IDE is the most comprehensive and powerful FPGA design and development software available. Libero IDE consists of a powerful suite of FPGA development tools providing designers with an efficient and comprehensive start-to-finish methodology, from schematic/HDL entry to place-and-route and programming. Libero IDE Gold has a design capacity of up to 1 M system gates or the smallest member of a device family, and thus provides capability for the AFS600 featured on the evaluation board in the Fusion Starter Kit. Libero IDE includes best-in-class FPGA tools from industry leaders Mentor Graphics<sup>®</sup>, Synplcity<sup>®</sup>, and SynapticCAD<sup>™</sup> to give you a complete FPGA design solution.

Libero IDE Gold combines into a single package all the tools you need to evaluate advanced Fusion features, including analog to digital conversion, the Fusion Flash memory blocks, AES security, user device serialization in the FlashROM, and high-speed programming. Libero IDE supports your own system-on-chip designs up to 600,000 system gates with the Fusion AFS600-based Starter Kit.



### Programming Cable

FlashPro3 uses a standard 10-strand ribbon cable terminated in standard JTAG dual row, 100 mm in-line sockets. Such cables are available from a variety of manufacturers. It is small enough to keep the entire programmer portable, and it can easily be replaced.

### User's Guide

If you have not used Actel Fusion devices or Actel Libero IDE software, the comprehensive user's guide contained in the Fusion Starter Kit will take you through the entire design process step by step, using Fusion devices. The tutorial uses a simple design as an example and takes you through the whole flow, from new project creation all the way to programming the device and demonstrating different aspects of temperature monitoring, PWM control, FlashROM security features, and device serialization.

### Schematics

The Fusion evaluation board schematics, schematic source files, board design files, and gerbers are also included in the kit. These files can be used as guidelines for your own board, or easily modified into your own design.

For more information regarding the **Actel Fusion Starter Kit**, please visit the Actel website at [www.actel.com](http://www.actel.com) or contact your local sales representative.

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