AN136

PRODUCTION PROGRAMMING OPTIONS FOR SILICON LABS DEVICES

Relevant Devices

This application note applies to all C8051Fxxx devices.

Introduction

This application note gives an overview of production programming options available for Silicon Labs devices. The two main categories for programming uninitialized devices are in-system programming and pre-programming. The most appropriate type of programming depends on the number of devices being programmed and whether access is available to the debug pins (JTAG or C2 interface) of the device. Once devices have been programmed once, they may be updated from application code using the UART or another interface.

Key Points

- When programing a device in-system, it is necessary that both the programming "Master" and the device being programmed share a common ground.
- Devices only need to be programmed once. Firmware updates can be received over any communications protocol supported by the system.
- The Silicon Labs (EC2) Serial Adapter used for development can also be used to program devices during production. Silicon Labs provides the tools necessary to streamline the debugging platform for production.

In-System Programming

In-system programming involves programming devices after installation in the end system. In this scenario, access to the debug pins (JTAG or C2 interface) is provided in the end system to enable connection to a programming "Master". This programming "Master" can be a Silicon Labs Serial Adapter (EC2), custom hardware, or for JTAG devices, a JTAG Boundary Scan test system that supports the programming of Silicon Labs devices.

Designing a System that Supports In-System Programming

Whether using the Silicon Labs Serial Adapter (EC2) or building a custom programming "Master", an in-system programmable system needs to provide access to the debug pins (JTAG or C2 interface) of the target device.

The pins required to program JTAG devices are TCK, TMS, TDI, TDO and GND. It is necessary that both the programming "Master" and the device being programmed share a common ground.

For C2 devices, access to C2CK, C2D, and GND are required. See Application Note AN124 on the Applications Web Page for more information on pin sharing with the C2 Interface. Also, target board schematics for C2 devices (e.g. C8051F30x-TB, C8051F31x-TB, etc.) can be used as examples. The schematic for each target board is available in its User's Guide. The User's Guide for each Silicon Labs Target Board can be downloaded from the Development Tools Web Page on the Silicon Labs website.

Silicon Labs (EC2) Serial Adapter and Interface Utilities

The Silicon Labs EC2 Serial Adapter used for system development can also be used to program devices during production.

Command Line Download Utility

If an EC2 Serial Adapter is used to program devices, Silicon Labs provides a Command Line Download utility '*FlashUtilCL.exe*' that supports downloading an Intel-HEX file to the target device. It also supports devices connected in a JTAG chain. The Command Line Download utility is available from the Development Tools Web Page on the Silicon Labs Website.

Custom Software Using the Silicon Labs Utilities DLL

The Command Line Download program utilizes the functions provided by the Silicon Labs Utilities DLL. This DLL may be used to write custom software (in Visual Basic or Visual C++, for example) that uses the EC2 Serial Adapter to program devices. For more information about the Silicon Labs Utilities DLL, see application note AN117 on the Development Tools Web Page.

Pre-Programming Devices

Pre-programmed devices are useful for end systems that do not provide access to the debug pins on the device. Devices are programmed before being installed in the end system. Pre-programming options include Silicon Lab's in-house programming service, creating custom hardware to program devices, or using a third party programmer.

In-House Programming

For production orders, Silicon Labs offers a programming service for all C8051F devices. The customer can install the pre-programmed devices directly in the end system without providing access to the debug pins. Contact your local sales representative for more information about this service. A list of local sales representatives is available from the "Contact Us" page on the Silicon Labs website.

Custom Hardware and Third Party Programmers

Another option for production programming is to build custom hardware to program the device prior to installation in the end system. This type of programmer would typically have one or more sockets to hold unprogrammed devices. The FLASH programming techniques in application notes AN105 (JTAG devices) and AN127 (C2 devices) can be used to implement a custom programmer.

Support for Silicon Labs devices is also being integrated into third party production programmers from suppliers found on our Programming Options page from the Silicon Labs website. Contact these suppliers for more information about their programming solutions.

Updating Firmware

All Silicon Labs devices have the ability to program FLASH from application code. Once uninitialized devices have been programmed, firmware can be updated using techniques described in this application note or through application code. Firmware updates through application code can receive the update through any of the communications peripherals such as the UART, SMBus/I^2C, etc. See application note "AN112 – UART In-Application Code Loading Examples" for an example UART firmware updater.

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- Updated references to application notes.
- Updated links to Silicon Labs website.

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