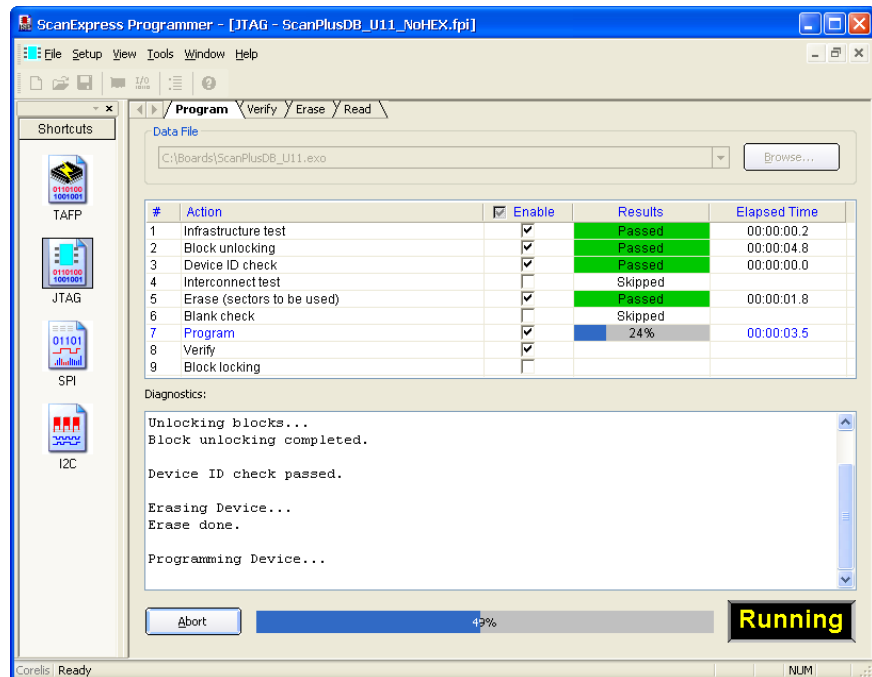


CORELIS

"We combine exceptional ease of use with advanced technical innovation"

ScanExpress Programmer™ Universal In-System Programming Tool

- ❑ Low cost and high-performance In-System Programming (ISP) of Flash memories, Serial EEPROMs, CPLDs, FPGAs, and other programmable devices
- ❑ Supports I2C, SPI, and JTAG interfaces
- ❑ In-system programming of Flash memory devices at their theoretical programming speed
- ❑ User programmable JTAG TCK speeds up to 100 MHz
- ❑ User programmable SPI SCK speeds up to 50 MHz
- ❑ Supports Standard, Fast, and High-speed mode I2C bus data rates up to 5 Mbits/sec
- ❑ User programmable I2C/SMBus SCL speeds up to 5 MHz
- ❑ JTAG, SPI and I2C interfaces are individually programmable from 1.25 to 3.3V
- ❑ Programs up to 4 target devices in parallel, programming and verifying via hardware in real time
- ❑ Memory contents can be dumped to a file and used to program parts on additional targets
- ❑ Powerful JTAG chain fault detection and diagnostics and a built-in debugger help isolate hardware problems quickly
- ❑ Intuitive 32-bit Windows®-based application with an easy to use Graphical User Interface
- ❑ Support for LabView, LabWindows/CVI, Agilent VEE, Visual Basic, and other third party test executives



Introduction

The increasing use and decreasing cost of programmable devices has caused their popularity to explode during recent years. The wide variety of available devices and programming methods requires acquiring and maintaining different types of in-circuit programmers.

The ScanExpress Programmer™ was designed to replace the various types of in-circuit programmers with a single universal programmer with a scalable architecture for future expandability.

The ScanExpress Programmer is a single, universal in-circuit programming tool that can program and verify Flash memories, serial EEPROMs, CPLDs and FPGAs. ScanExpress Programmer provides common programming functions including read, erase, blank check, program, verify, device ID check, and others.

All of these functions can be performed while the target device is installed in-circuit.

Programming memories in-circuit is performed in development, production, and in the field. For development, software engineers can change code stored in memory devices during the software development. For production, in-circuit programming allows memory devices to remain on the shelf in an unprogrammed or blank state. These blank devices can then be installed at assembly and programmed in-circuit, thus reducing programming and tracking costs. In the field, support engineers and technicians can upgrade the product with new released firmware.

ScanExpress Programmer offers several programming methods. Utilizing a high-performance Corelis controller with built-in support for

JTAG, I2C, and SPI, and user-friendly Windows-based software, ScanExpress Programmer can program components utilizing any of four individually licensed modules:

- SPI Programmer
- I2C Programmer
- Target Assisted Flash Programmer (TAFP)
- JTAG Programmer

The Serial Peripheral Interface (SPI) Programmer module provides fast programming of any SPI memory device by controlling the SPI bus signals directly through a dedicated high-speed SPI interface available on select Corelis boundary-scan controllers.

The Inter-Integrated Circuit (I2C) Programmer module provides fast programming of I2C memory devices by controlling the I2C bus signals directly through the dedicated I2C interface available on select Corelis boundary-scan controllers.

The Target Assisted Flash Programmer (TAFP) module utilizes the CPU on the target board to achieve the fastest programming performance of flash memory devices.

The JTAG Programmer module is the most flexible programmer and can program flash memory and serial EEPROM devices which are connected to boundary-scan components. The JTAG programmer can also program CPLDs, FPGAs, and other devices that are JTAG in-system programmable, including those that are compliant with IEEE-1532.

Figure 1 depicts the relationship between the ScanExpress Programmer software, controller, and a target board with programmable devices.

SPI and I2C Programming

ScanExpress Programmer provides easy-to-use high-speed programming of SPI and I2C compatible serial EEPROMs and Flash memories. Users can program the devices in-system and at maximum programming speed - typically in several seconds (depending on the memory size).

The SPI and I2C GUIs (see figure 2)

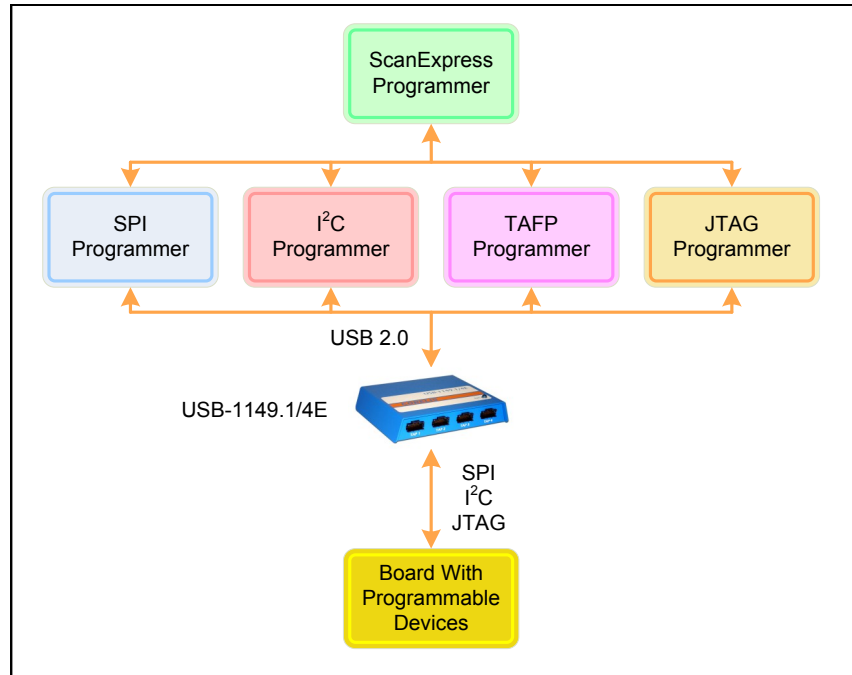


Figure 1. ScanExpress Programmer Modules

allow Erasing, Programming, Verifying, and Reading the content of the EEPROM and Flash memory and saving it to a file on the computer. Standard Motorola S-Record file, Intel Hex file or a hex-text file formats are supported. The Read button allows immediate display of data from any user specified address block of the serial memory device.

ScanExpress Programmer supports most common I2C and SPI devices

such as Atmel, Microchip, Xicor and generic device manufacturers. Additional devices and manufacturers support is being added by Corelis from time to time. Contact Corelis support (support@corelis.com) if the I2C or SPI serial EEPROM device that you need to program is not currently listed.

JTAG Programming

The JTAG Programmer module

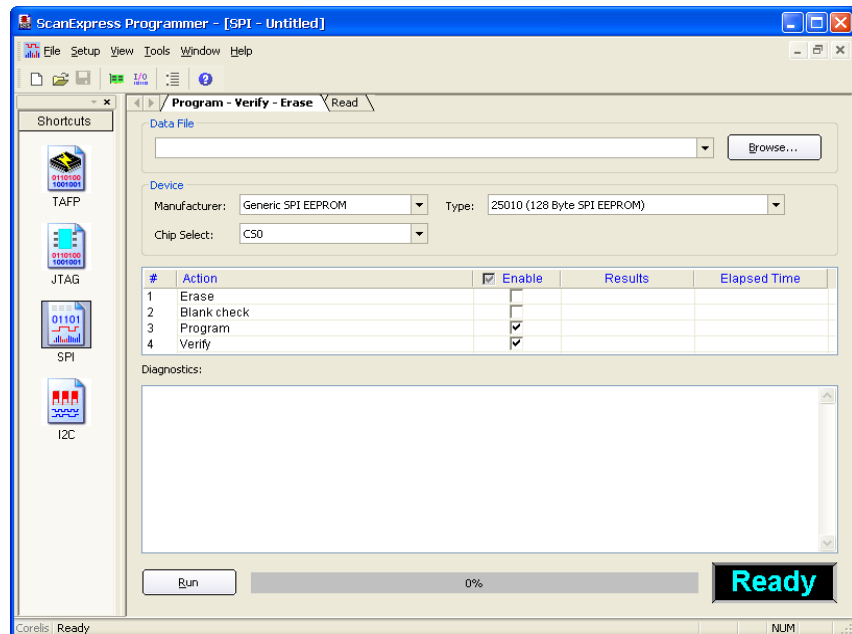


Figure 2. ScanExpress Programmer SPI Programmer Window

allows in-system programming of flash memory and serial EEPROM devices that are connected to boundary-scan compatible devices. Figure 3 depicts a block diagram of this concept. The JTAG Programmer module uses a special target flash description board file and a standard hex or binary data file to program the flash device. The Flash Programming Information file (.fpi), commonly called a “board file,” provides the JTAG scan chain information and flash device parameters while the data file provides the flash content.

Board files can be generated by either of two Corelis companion products: ScanExpressTPG™ or ScanPlus Flash™ Generator which are sold separately. These companion tools use the netlist of the target board, BSDL files for all boundary-scan components and a special built-in flash library. Compiling these files with a flash model creates the board file which is then used by the JTAG Programmer module to program the flash device.

After the board file is loaded, the user can specify a data file and program the flash device on one or more target boards. Board files also allow “embedding” the flash data image, which allows the user to skip the step where data for the flash devices must be loaded. This is useful in the case where a particular target board configuration is always flashed with the same data image.

An optional feature included in board files is an infrastructure test which verifies that each boundary-scan device in the scan chain is operating properly. The JTAG Programmer module will execute the infrastructure test prior to programming when this option is selected. If the infrastructure test fails, programming will not occur, and a detailed diagnostic message will display.

Additional pre-programming tests can be selected in order to detect problems with the flash configuration and/or hardware. An interconnect test is available which performs extensive read-write testing of the flash address and data buses. A device ID check will read the flash device’s internal manufacturer and part code and compare it with the expected value. There is a blank check which will read the entire

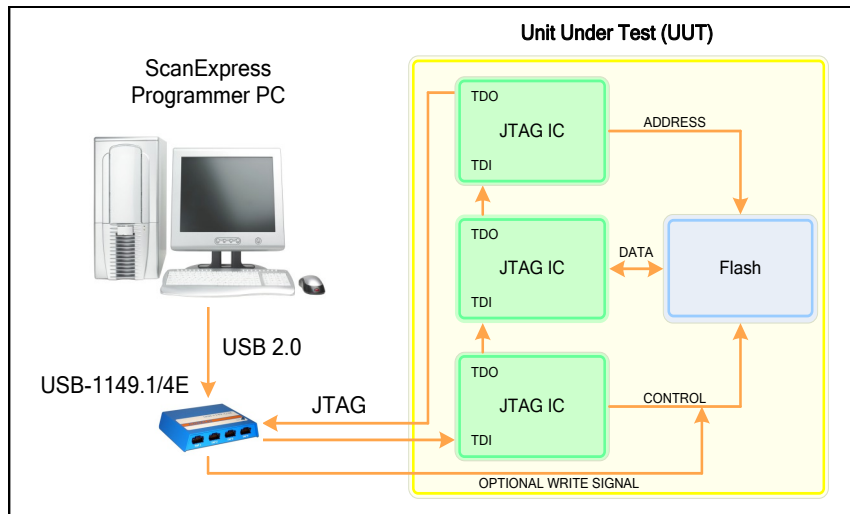


Figure 3. ScanExpress Programmer JTAG System Environment

flash prior to programming and ensure that its contents are empty. If any pre-programming test fails, programming will not occur, and a detailed error message will display.

Several other options are also available. Polling of a flash devices’ “status register” can be turned on (for increased reliability) or off (for increased speed). Multiple-TAP boundary-scan controllers can be used to allow programming of several identical boards in parallel. Verification for the correctness of the programmed data is also avail-

able. After programming, if the verify option is enabled, each location of the flash device is read and compared with the value it was programmed with.

On designs where multiple devices are used to form larger bus widths, the JTAG Programmer module can program all of these devices in parallel from a single data file. There is no need to split a data file up and program each device separately.

The existing contents of flash devices can be automatically read and

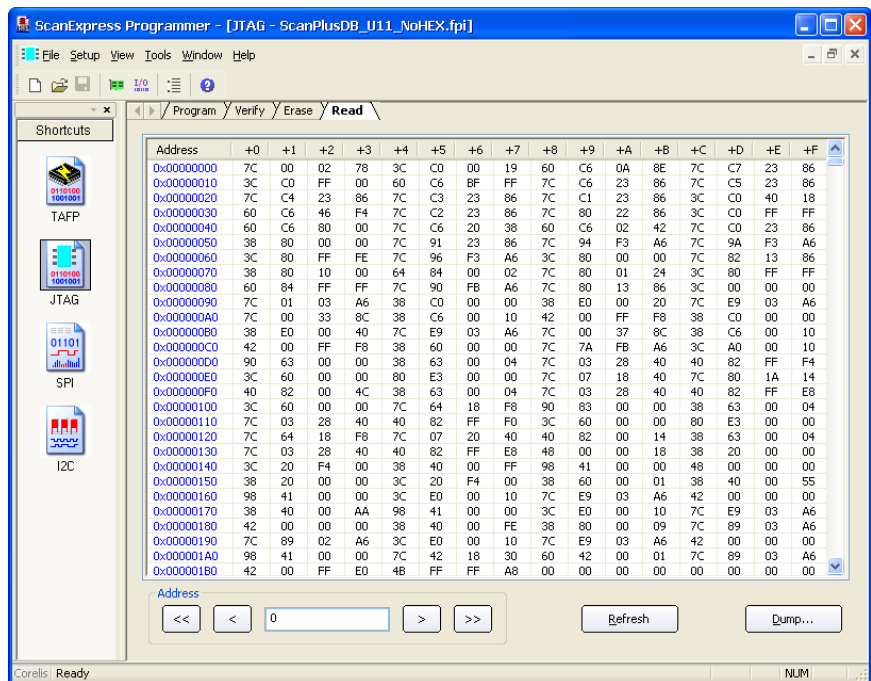


Figure 4. ScanExpress Programmer Flash Read Tab (JTAG)

“dumped” to one of several common data file formats for later use with the JTAG Programmer module or other software packages. In addition, there is also a powerful “Read Contents” interface which allows immediate display of data in any portion of the flash device without the need to perform a time-consuming read of the entire device.

In many cases, it is only required to program a small portion of a flash device, leaving a large amount of locations blank. The JTAG Programmer module significantly reduces programming time in these situations by automatically determining which locations are unused and skipping over them.

The JTAG Programmer module supports an external write strobe signal (DirectWrite™), which can reduce programming times even further (refer to Figure 3). When the external write strobe is used, the write enable to the flash device being programmed is asserted directly by the boundary-scan controller instead of through boundary-scan devices on-board. The number of data scans required to program the flash device is reduced, thereby reducing programming times.

Many recent flash devices support the ability to “lock” individual blocks/sectors of flash memory. The JTAG Programmer module provides the capability to automatically lock any chosen block(s) after programming and allows already-locked blocks to be easily unlocked for reprogramming.

In addition to its extensive flash-related features, the JTAG Programmer module can also program serial EEPROM and DiskOnChip® devices and execute various ISP programming files for CPLDs and FPGAs. The module contains a built-in SVF (Serial Vector Format) file parser which is capable of executing SVF files created by manufacturers’ tools to program their devices. The JTAG Programmer module also contains a JAM and STAPL language interpreter for executing ISP files of the vector-independent JAM and Bytecode formats.

ScanExpress Programmer can also execute various In-System Programming (ISP) files from third party applications using DLLs or a command line interface. Drivers for the

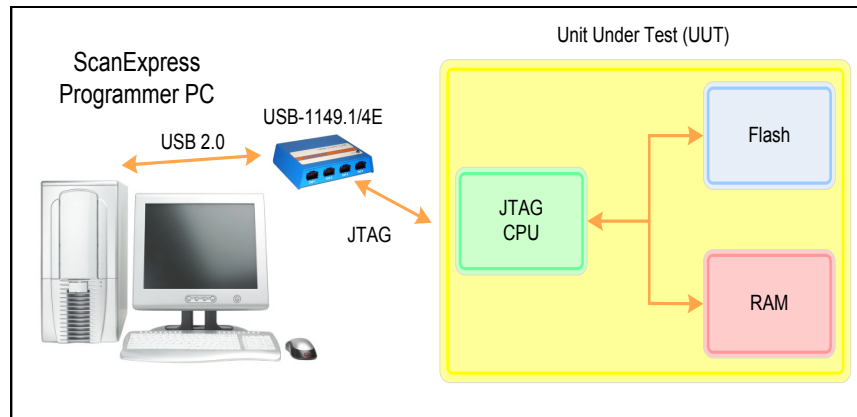


Figure 5. ScanExpress Programmer Target Assisted Programmer System Environment

popular National Instruments LabWindows™/CVI, LabView™, and Agilent VEE test environments are provided.

Target Assisted Flash Programming (TAFP)

The Target Assisted Flash Programmer takes advantage of the embedded CPU on the target board to shorten the Flash memory programming time and simplify the operation of Flash programming. With the Target Assisted Flash Programmer, the user can perform many Flash programming functions such as erase, blank check, program, verify, obtain device ID, etc. All of these functions can be performed while the device is installed in-circuit.

The Target Assisted Flash Programmer has the ability to test the JTAG connection, test the RAM, check the Flash device ID, erase the Flash device, verify the erasure, download Flash data to RAM, program the Flash device, and verify the Flash data in one step.

The Target Assisted Flash Programmer relies on using a supported JTAG compatible CPU device on the target in order to accomplish the Flash programming operation. Please contact Corelis for CPU devices currently supported.

Boundary-Scan Controllers

The ScanExpress Programmer currently supports the following boundary-scan controllers offered by Corelis: PCI-1149.1/Turbo™, USB-1149.1/E™, USB-1149.1/4E™, and the NetUSB-1149.1/E™. Please contact Corelis regarding support

for other controllers.

Supported Devices

The ScanExpress Programmer supports dozens of popular flash, serial EEPROM, CPLD and FPGA devices available today from a wide variety of memory manufacturers. New device support is constantly being added.

System Requirements

The ScanExpress Programmer software is a 32-bit Microsoft Windows 2000/XP application.

Your PC must have a minimum configuration as follows:

- Microsoft Windows 2000 or XP installed
- CD-ROM drive
- Pentium III processor (1 GHz) or higher
- 128 megabytes (MB) of RAM
- 50 MB of free hard disk space
- Display adapter supporting at least 1024x768 resolution and 256 colors
- A standard 25-pin parallel printer port or available USB port. The ScanExpress Programmer software is protected with a hardware key attached to either the printer port or a USB port. The parallel port hardware key has a pass through feature which will not affect the operation of the printer.

Ordering Information

The ScanExpress Programmer is available in the following configurations:

- ScanExpress Programmer - Direct SPI and I2C Programming (P/N: 20601)
- ScanExpress Programmer - Target Assisted Flash Programming (P/N: 20602)
- ScanExpress Programmer - JTAG Flash Programming (P/N: 20603)
- ScanExpress Programmer Professional (P/N: 20600), which includes the SPI, I2C, Target Assisted Flash and JTAG Flash Programming

The ScanExpress Programmer includes:

- Software CD
- User's Manual
- Parallel Port or USB License

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