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iMPACT

Introduction to SPI Configuration

The Serial Peripheral Interface (SPI) is a 4-wire synchronous serial master/slave interface for connecting low speed external devices using a minimal number of wires. This serial data link was pioneered as a serial communication interface between a microcontroller and its peripherals and is a popular interface in embedded and consumer markets and now can also be used directly to configure Xilinx® FPGAs. When using this four-signal interface to configure a Xilinx FPGA from an SPI serial flash, the FPGA is the master device and the SPI serial flash acts as the slave device. The master drives the serial clock.

iMPACT allows a designer to program select SPI serial flash, which is used to configure the FPGA through the SPI interface, via two methods. A designer can either directly tie the Xilinx cable to the SPI signals on the flash device or indirectly program the SPI serial flash by tying the Xilinx cable to the boundary-scan pins on the FPGA and having the FPGA drive the SPI interface using a special purpose soft core. These methods are briefly discussed below.

The SPI flash families supported for programming by iMPACT are:

- Atmel AT45DB family
- Numonyx (STMicro) M25P, M25PE, and MP45PE families
- Winbond W25Q family

Direct SPI

For direct SPI programming, you must connect your Xilinx cable to the four pins (SCLK, SS_n, MOSI, MISO) of the SPI port on the target SPI PROM. The FPGA pins connected to the SPI PROM should be three-stated since the cable drives the configuration data to the SPI port pins and programs the SPI PROM. If you have more than one SPI PROM to program, you must pull the wires off the first PROM and reconnect them to the next PROM you wish to program.

For further information on configuration with SPI flash, see [Application Note XAPP951](#).

Programming SPI Flash through Boundary-Scan and an FPGA

SPI Flash devices do not have a boundary-scan interface. However, using a special purpose soft-core loaded in an FPGA, it is possible to access an SPI PROM attached to an FPGA through the FPGA's boundary-scan port. This soft-core provides a translation of data supplied through the FPGA's boundary-scan interface to the SPI protocol appropriate for programming the attached SPI PROM. iMPACT will program supported FPGA families with the appropriate Boundary-Scan-to-SPI translation interface soft core immediately prior to the SPI PROM being programmed. In iMPACT, this programming method is referred to as indirect programming.

For more information on indirect programming, see [Introduction to Indirect Programming – SPI or BPI Flash Memory](#).

See Also

[Programming Devices Using Direct SPI](#)

[Introduction to Indirect Programming – SPI or BPI Flash Memory](#)

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