

Summary

This application note discusses the in-system programming speed of the XC9500 devices.

Xilinx Family

XC9500

Introduction

XC9500 devices receive programming vectors and instructions via the JTAG Test Access Port. During programming, the address and data information is shifted in first and then a "burn-in" time is initiated to imprint the programming data into the selected flash cells. This is repeated for all flash memory addresses within the device.

Therefore, the time required to program an XC9500 device includes two components: the information download time and the flash memory burn-in time. In the typical application, where the JTAG clock operates from 1MHz to 10 MHz, the flash memory burn-in exceeds 90% of the total programming time.

Device Programming Times

Programming time varies greatly, depending on the programming environment.

Programming in a Production Environment

In a production environment, fast programming times translate to reduced costs, and most Automatic Test Equipment (ATE) used for board testing is capable of efficiently downloading information to the XC9500 devices at the maximum speed of 10MHz. In order to minimize the production programming costs, XC9500 devices are fully erased and ready for programming when shipped from the factory.

The device programming times for a production environment are shown in [Table 1](#).

Programming in a Development Environment

The device programming times in a typical development environment are usually much longer than those for the production environment for several reasons; there is overhead time spent in the real-time generation of programming vectors from the JEDEC bitmap, bandwidth limitations for outputting JTAG vectors using a general purpose computer, and the time required to erase the device. Together, this overhead can cause a 10 to 50 times increase over the programming times shown in [Table 1](#).

The development environment programming times vary depending on whether the download cable is parallel or serial and they depend on the configuration and type of base computer system.

Programming Multiple Devices Concurrently

Multiple devices in a JTAG chain can be programmed concurrently by downloading all devices with the programming information and then concurrently burning-in all devices in the chain. Therefore, because the download time is small, the total time required to program all devices in a chain is only a little longer than the time required to program the largest device in the chain.

Conclusion

XC9500 devices can be programmed very quickly in a production environment.

Table 1: Typical Device Programming Times

XC9500 Device Type	Programming Time Using ATE at 10MHz		
	1 Device	10 Devices	20 Devices
XC9536	4.8 seconds	5.0 seconds	5.3 seconds
XC9572	5.4 seconds	6.0 seconds	6.6 seconds
XC95108	4.8 seconds	5.7 seconds	6.6 seconds
XC95144	6.9 seconds	8.1 seconds	9.3 seconds
XC95180	9.6 seconds	11.4 seconds	13.2 seconds
XC95216	12.6 seconds	14.6 seconds	16.6 seconds
XC95288	18.3 seconds	20.8 seconds	23.3 seconds

