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XC9572 CPLD Board for Digital Design Applications

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Abstract

This paper presents the implementation of Complex Programmable Logic Devices (CPLDs) boards for digital design application and develop on XC9500's Family Xilinx's CPLD user programmable in the system (ISP). The objective of the designed board is for the laboratory experiments in the University. The CPLD board will be use in Digital Logic Design Laboratory, it will help student to implement various digital logic circuits such as Digital Clock, Digital Counter or any digital logic in a simple and efficient way.

Keywords*: Complex programmable logic device, CPLD, digital devices, Xilinx, XC9500, ISP*

1. Introduction

In universities, students spend most of the time to do tedious task of wire wrapping individual logic gates. For industries, electronic product design has to be implemented by making a Print Circuit Board (PCB) mounting basic multiples of IC chips. Testing the designed circuit can be done only after assembly and soldering IC chips onto PCB (Threevithayanon *et al.* 2005). Now programmable logic devices, especially Complex Programmable Logic Device (CPLD), have begun to take on this role in system design. CPLD will reduce both cost and time in implementing the IC chip and Digital design compare with the old fashion method. As an extension from the previous article (Threevithayanon *et al.* 2005), CPLD is taken in for further research.

Digital logic circuit is widely used in many applications. Thus many companies (Xilinx, Atera, Atmel) are trying to develop the way to implement digital logic circuit easier, quicker and cheaper. To implement larger circuits, it is convenient to use a chip that has larger logic capacity. CPLD is a programmable logic device supporting implementation of medium capacity logic circuit and is a developed chip, and hardware programming can be easily configuring the device (Brown and Verilog 2003).

After implemented FPGA board (Threevithayanon *et al.* 2005), the research team of Assumption University tries to further develop an educational evaluation CPLD board for small-medium capacity digital design. Our work is focused on XC9572 CPLD chip from Xilinx, which can contain 1600 logic gates. CPLD is nonvolatile device, so no need to reprogram when the power is up.

This paper composes of six sections. The next section reviews on XC9500 family the CPLD core from Xilinx. Board design and specification will be discussed in Section 3. Sections 4 and 5 will discuss with CPLD software development and board application. The main summarized will be concluding at the end of this paper.

2. Overview of CPLD XC9500 family

The XC9500 CPLD family has six models: XC9653, XC9572, XC95108, XC95144, XC95216 and XC95288. The system gates will range from 800 gates to 6,400 gates following the end of the model number. These six devices cover the range from 36 to 288 macrocells.