

一种基于 LUT 和二模冗余的胚胎数字电路故障检测方法

王 涛, 蔡金燕, 孟亚峰

(军械工程学院电子与光学工程系, 河北 石家庄 050003)

摘 要: 研究了数字电路故障的基本特点, 结合电路自修复对故障信息的要求, 提出了一种基于 LUT 和二模冗余的故障检测方法, 该方法利用 LUT 来存储细胞正常工作的状态, 利用正常工作状态和实际工作状态的对比, 来实现细胞工作状态的实时监测, 从而检测细胞是否故障. 该方法能够同时对多个细胞进行检测, 增加故障覆盖率, 减少了设计的复杂程度和硬件资源的消耗, 具有很好的工程实用价值.

关键词: 胚胎数字电路; LUT; 二模冗余; 故障检测

A New Embryonic Digital Circuit Fault Detection Method Based on LUT and Dual Modular Redundancy

WANG Tao, CAI Jin-yan, MENG Ya-feng

(Department of Electronic and Optical Engineering, Ordnance Engineering College, Shijiazhuang 050003, China)

Abstract: In this paper, the basic characteristics of the digital circuit fault are studied, combining the demands of circuit on the fault detection, a new method based on LUT and dual modular redundancy is proposed. Using the LUT to storage the normal state of working cell, comparing the normal output of working cell and the actual output of working cell, to realize the real-time detection of the working cell, to detect whether the working cell is failure or not. This method can simultaneously test multiple cells, reducing the complexity of the circuit system and the consumption of hardware resources, which has great engineering application value.

Key words: embryonic digital circuit; LUT; dual modular redundancy; fault detection

作者简介:

王 涛 男, (1992-), 硕士研究生. 研究方向为电子系统故障检测及自修复. E-mail: wangtao920110@126.com.

蔡金燕 男, (1961-), 教授, 博士生导师. 研究方向为检测理论、可靠性技术及电子系统自修复.

孟亚峰 男, (1970-), 副教授, 硕士生导师. 研究方向为装备故障检测、可靠性理论.