Compensator study and implementation for digital pulse-width modulation system = 數位式脈衝寬度調變系統之補償器研發與實

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摘 要

本論文對於切換式電源轉換器描述兩種脈波寬度調變積體電路，分別為類比式脈波寬度調變器與數位式脈波寬度調變器。由於近來互補金屬氧化半導體技術的發展，愈來愈多的電晶體能夠製作在單一晶片上，電源管理積體電路如高效率低電壓的切換式直流－直流轉換器已廣泛被應用在消費性電子產品上，以用來提升產品的效能並降低功率消耗。 應用於切換式直流－直流轉換器的類比式控制系統已經發展一段時間，它是個很成熟的技術；而近幾年來，相較於類比積體電路，數位積體電路較容易設計，以數位控制系統來取代類比控制系統也經常被提及與討論，此兩種架構的優缺點將在本論文中被探討。類比式控制積體電路的主要架構包含兩級式放大器、壓控震盪器、三角波產生器和遲滯比較器；數位式控制積體電路的主要架構包含類比－數位轉換器、補償器和數位脈波寬度調變器。 類比控制器積體電路與類比-數位轉換器透過財團法人國家實驗研究院晶片系統設計中心製造，使用台灣積體電路製造股份有限公司所提供的0.35um 2P4M 3.3V/5V Mixed Signal CMOS 製造技術。類比式脈波寬度調變的晶片面積為0.35*0.37mm2，類比-數位轉換器的晶片面積為0.555*0.555mm2。補償器與數位脈波寬度調變器則使用Xilinx FPGA Spartan2 晶片來實現。

關鍵詞 : 補償器;數位式脈波寬度調變;直流－直流轉換器

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