應用U型缺陷接地面結構抑制共模雜訊

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摘 要

高速數位電路中，由於電路規劃趨於緊密以及操作頻率快速增加，使訊號在微帶線傳輸過程中易因受雜訊干擾。採用差動模式傳輸可以降低雜訊影響並在操作頻率極高的狀況下維持良好的訊號完整度，但差動對需要嚴格的對稱條件。在實際佈局上，轉角結構會影響差動傳輸線的特性，在此非平衡式架構下，傳輸線將會額外激發共模雜訊，對於訊號品質會產生不良影響。隨著傳輸速率越快以及電路設計越複雜，共模雜訊對頻帶的干擾也越嚴重。為改善差動對的傳輸品質，本論文提出新的傳輸線架構，以確保傳輸差模訊號的完整性，又能有效抑制共模雜訊。 由於電路系統複雜，往往難以更動改善佈局，因此利用接地面來抑制雜訊，將可在不更動訊號電路的情況下，提高傳輸穩定度。於本論文中，應用陷接地面結構的微波濾波技術來抑制共模雜訊。首先，探討缺陷接地面結構對差動傳輸線的耦合量影響，並藉此分析缺陷接地面結構對頻率響應影響，進而改善差動傳輸線在高速數位系統的訊號傳輸品質。最後，以混模散射參數及眼圖兩種方式來分析電路，並將模擬數值與量測數據做比較。 由分析結果得知，使用新架構之後，共模雜訊受到顯著抑制，原系統傳輸的差模訊號仍維持良好的完整性，因此本架構在提高差動傳輸過程的穩定度有很大的助益，具有實用價值。

關鍵詞 : 差動傳輸線 ; 共模雜訊 ; 訊號完整性 ; 缺陷接地面

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