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An Embedded Isolation Moat Structures With Wide Stopband and Low Parasitic Effect for Elimination Simultaneous Switching Noise

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We use two embedded isolation moats which have different size to obtain the wide stopband elimination performance. The proposed structure is realized by embedding the double isolation moats between power and ground planes. The suppression frequency range of the proposed structures is from 1.2 to 7.2 GHz and the peak noise improvement in time domain is 36%. Furthermore, the proposed structure uses two elimination cells to avoid the parasitic effect generated in the frequency range of several hundred MHz.

Schematic diagram of the proposed double isolation moat structure., as shown in Figure 1. The exciting and receiving port are defined as port 1 and port 2, respectively. Two isolation moats are located around the exciting port to observe the suppression behaviors. Dimension of the two-layer PCB is 90 mm×90 mm and top view of the proposed structure is shown in Figure 1(b).

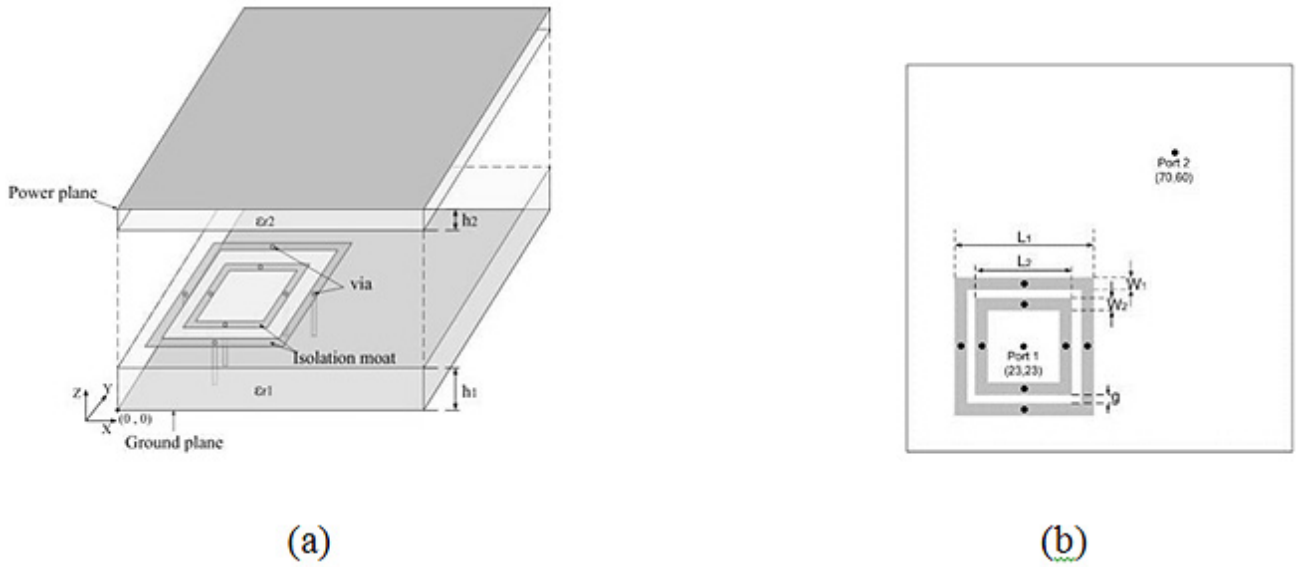

Figure 1. Schematic diagram of the proposed double isolation moat structure. (a) The 3-D view of the structure. (b) Top view of the embedded structure.

There are two isolation moats between power and ground planes. The external moat defined moat 1, and the other called moat 2. Figure 2 shows the measured and simulated S21 for the proposed double isolation moats structure. The difference between measured and simulated results could be resulted from the fabrication accuracy for via dimension and the air gap among the laminated construction.

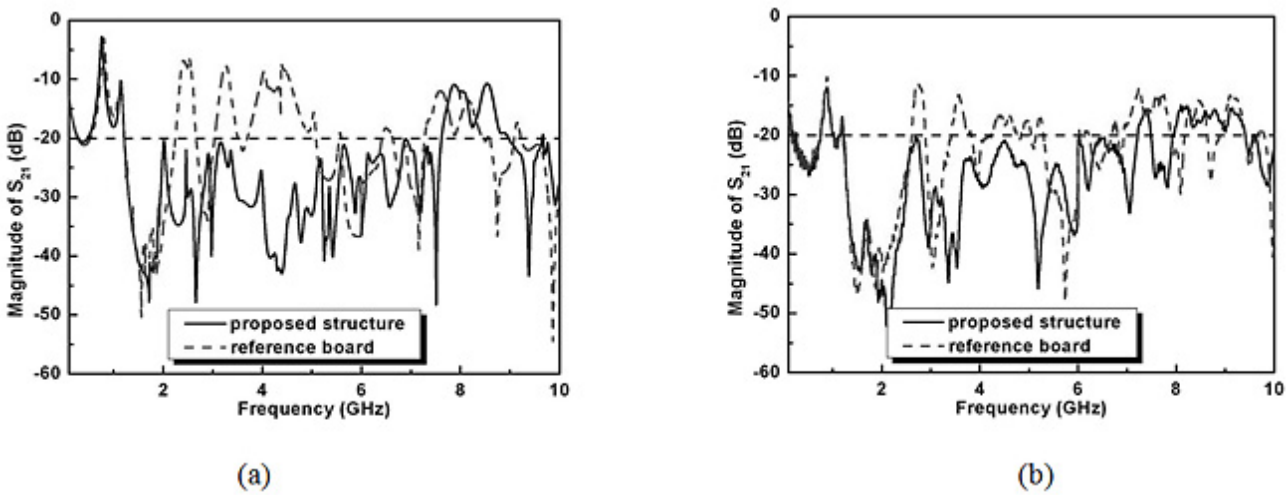

Figure 2. The (a) simulated, (b) measured S21 for the proposed double isolation moats structure.

A double isolation moat structure with wide stopband and low parasitic effect is proposed. This concept consists of cascading different dimension of the isolation moats, creating rejection over a wider frequency region. The varied size of the moat structures should be placed around the same port to produce effective SSN suppression. The proposed structure behaves excellent SSN suppression from 1.2 to 7.2 GHz and low parasitic effect in several hundred MHz. The ultra-wide bandwidth SSN suppression using varied dimension of the proposed structure could be obtained.