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Balanced-to-Balanced Quad-band Diplexer Based on Multilayer Open-Loop Resonators

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The development in recent years of new wireless communications systems, satellite navigation systems and many other radio communication applications has led to an increase in the number of required frequency bands for proper operation. This means that modern communication devices are designed to deal with an important number of frequency bands. Obvioulsy, whenever a new band is open for commercial use, it will be incorporated to common use while continuing to use existing bands. For this reason, in the last two decades there has been an important demand of multiband devices, such as multiband bandpass filters (BPFs), multiplexers, or diplexers, among many others. Along with this increase in attention to multiband devices has also increased the interest on differential/balanced devices, It is well known that differential/balanced devices offer unique advantages over their single-ended counterparts, such us inherent immunity to electromagnetic interference and environmental noise, as well as a better signal-to-noise ratio that allows lower voltage operation. It is precisely in the junction of these two features that multiband devices operating with differential/balanced signals are highly demanded for communication applications [1]. Among all the differential/balanced devices capable of operating with multiple bands, diplexers are one of the most interesting ones due to their capability of incorporating in one single device the operations of signal filtering and routing. In this work, a compact balanced quad-band diplexer based on multilayered, magnetically coupled, open-loop resonators is prroposed. The multilayer topology is composed by two different dual-band bandpass filters (DB-BPFs), each one located in one single layer. The individual filters are based, as it has been commented, on magnetically coupled resonators, similar to the one reported in [2]. The main features offered by the proposed design are: 1) high selectivity between passbands thanks to the appearance of several transmission zeroes (TZs) between them; 2) strong common-mode suppression over a relatively large bandwidth thanks to the use of magnetic coupling [2], and 3) simple design procedure, which makes the structure easily adaptable for other central frequencies and bandwidths. Figure 1 schematically shows the layout of the proposed diplexer (two-layer microstrip implementation). The three differential ports (one input and two output ports) as well as the relevant dimensions are included. Good agreement between simulations and measurements has been achieved and will be presented in the conference.

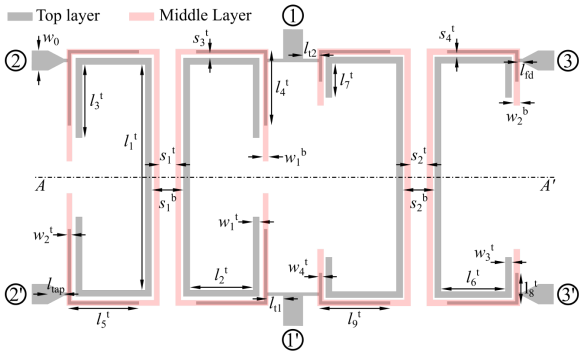

Figure 1. Layout of the two-layer microstrip diplexer (gray and light pink open loops are printed at two different levels.

References

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