

A novel scheme for substrate integrated waveguide (SIW) transitions to planar transmission lines is proposed. The idea is the insertion of impedance matching network along with the mode transition realized by a combination of lumped elements. We published earlier similar work. It was a set of the transitions between SIW and microstrip (MS) using lumped elements, and its application as an SIW quadrature power splitter. Throughout that work, the proposed SIW transition using lumped elements was realized focusing only on the MS structure. Now is to widen the use of the proposed transition scheme using lumped elements. In this paper, we propose that transition scheme also works with SIW-to-coplanar waveguide (CPW) and SIW-to-grounded CPW. Also, in addition to the above quadrature power splitter, we show that the proposed scheme can also be used as an SIW balun. Most of the proposed transition schemes yield approximately  $0.8 \pm 0.5$ -dB passband insertion losses per target band. Others, such as SIW quadrature power splitter, work with  $4 \pm 0.5$ -dB insertion loss per band of 4.2-5.5 GHz,  $90^\circ \pm 5^\circ$  phase variation per 4.49-5.9 GHz, and SIW balun works with  $4 \pm 0.5$ -dB insertion loss in 4.34-5.29 GHz,  $180^\circ \pm 5^\circ$  phase variation in 4.6-5.34 GHz.