

This paper presents the implementation of a broadband quasi-circulator through a cascading distributed balun using a 90-nm CMOS process. The isolation,  $|S_{31}|$ , of the proposed three-port quasi-circulator can be acquired through the phase cancelation technique, by connecting an additional distributed amplifier in parallel between ports 1 and 3. The thorough analysis based on an eight-port chain matrix and scattering matrix is presented for refining the circuit parameters in the initial design. Measured results show that the proposed quasi-circulator attains a broad operation bandwidth ranging from 10 to 67 GHz. Moreover, the quasi-circulator also has good insertion gain of 0.5 to 4.8 dB, as well as isolation  $|S_{31}|$ , which is better than 23 dB. Consequently, the proposed quasirculator delivers wide bandwidth performance, good port-toport isolations, good insertion gain, and high linearity based on the cascading distributed balun with phase cancelation technique.