

23:1 Bandwidth ratio quasi-lumped component balun on a multilayer organic substrate

ISSN 1751-8725

Received on 12th September 2015

Revised on 21st December 2015

Accepted on 5th January 2016

doi: 10.1049/iet-map.2015.0589

www.ietdl.org

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Abstract: In this study, the authors present the design and development of a novel ultra-wideband coupled-line balun on a multilayer liquid crystal polymer substrate. The balun is designed using a quarter wavelength ($\lambda/4$) asymmetric broadside coupled line. The defected ground structure and a lumped phase compensation circuit are developed to achieve wide bandwidth performance for the balun. The balun has a measured bandwidth ratio of 23:1, from 80 to 1860 MHz. Within the operating bandwidth, the experimental results demonstrate that the balun achieves an input return loss of better than 10 dB, an insertion loss of better than 1 dB, an amplitude imbalance of better than ± 0.4 dB and a phase imbalance of better than $\pm 10^\circ$. The size of the balun is 40.64 mm \times 40.64 mm or $0.22\lambda_g \times 0.22\lambda_g$, where λ_g is the guided wavelength at the centre frequency of 970 MHz.