

Cross-coupled YBCO BPFs with wide upper stopband using quarter-wavelength stepped-impedance resonators

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Abstract

This paper presents a cross-coupled high-temperature superconducting (HTS) bandpass filter (BPF) design using quarter-wavelength stepped-impedance resonators ($\lambda/4$ SIRs) for the wireless communication applications. A pair of transmission zeros associated with the cross-coupled configuration is designed to be placed near the passband skirts, greatly sharpening the rolling-off at the passband edges. The spurious-passband center frequency of the BPF using $\lambda/4$ SIRs is simulated to be higher than that of the BPF adopting $\lambda/2$ SIRs. A BPF using $\lambda/4$ SIRs, conceived to be smaller than the corresponding BPF using $\lambda/2$ SIRs, has been fabricated by double-sided depositing patterned YBCO film on a 10-mm-square and 0.5-mm-thick LaAlO₃ substrate and by putting them in a copper housing. The measured results revealed that this BPF has a very wide stopband bandwidth beyond the desired passband.