The Characteristics of High-Tc Superconducting YBCO Filters with Spurious Suppression and Annealing Effects on the Micro

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ABSTRACT

This study proposes a bandpass filter design method for suppressing spurious responses in the stopband .i.e. passband responses around the first two spurious frequencies 2fo and 3fo cause the poor out-of-band performance. Using step impedance resonator structures with the same fundamental frequency, we can improve the stopband rejection of a bandpass filter. The simulation and measurement results show that the filter can effectively suppress spurious responses at 2fo and/or 3fo by more than 20 dB. For fabrication, high-Tc superconducting YBa2Cu3Oy (YBCO) films were deposited on double-side polished 0.5-mm-thick (100) LaAlO3 (LAO) substrates utilizing a radio-frequency sputtering system. The filters have been fabricated by the double-sided depositing patterned YBCO films on a 15-mm-square LAO substrate and by putting them in a copper housing. The temperature-dependent microwave properties are also discussed. On the other hand, it is found that the critical temperature Tc increase from 88.1K to 88.9K , quality factor Qu increases from 3912 to 4378, and the surface resistance degreases from 0.504 mΩ to 0.472 mΩ for YBCO films annealed at 550 ° C in oxygen atmosphere.

Keywords : Spurious responses ; Step impedance Resonators ; Filter

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