The Fabrication And Characteristics of Dual-Band Filters Using High-Tc Superconducting YBa2Cu3O7-δ Thin Films

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ABSTRACT

A step-impedance microstrip band-pass filter is presented for the applications of IEEE 802.11b (2.4 GHz ~ 2.48 GHz) and IEEE 802.11a (5.2 GHz ~ 5.35 GHz) on the multimode wireless local area networks. Using IE3D electromagnetic simulation software, the filter is designed with stepped impedance resonators and shows a dual-passband response. Furthermore, the cross-coupled configuration makes the rejection slop sharp by producing a single pair of transmission zeros at finite frequencies near the first pass band. The simulation and measurement results show the dual-band feature of two pass-bands at 2.42 and 5.20 GHz with insertion losses of 0.01 and 0.17 dB, and bandwidths of 15 and 6 MHz, respectively. For fabrication, high-Tc superconducting YBa2Cu3O δ (YBCO) films were deposited on double-side polished 0.5-mm-thick (100) LaAlO3 (LAO) substrates utilizing a radio-frequency sputtering system. The dual-band 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.

Keywords : Dual-band ; Step impedance Resonators ; Filter ; High-Tc superconducting

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