Abstracts

High-Power HTS Microstrip Filters for Wireless Communication (Dec. 1995, Part II [T-MTT])

G.-C. Liang, D. Zhang, C.-F. Shih, M.E. Johansson, R.S. Withers, D.E. Oates, A.C. Anderson, P. Polakos, P. Mankiewich, E. De Obaldia and R.E. Miller. "High-Power HTS Microstrip Filters for Wireless Communication (Dec. 1995, Part II [T-MTT])." 1995 Transactions on Microwave Theory and Techniques 43.12 (Dec. 1995, Part II [T-MTT] (1995 Symposium Issue)): 3019-3028.

The performance of narrowband microstrip filters with low insertion loss and high power-handling capabilities made from YBa/sub 2/Cu/sub 3/O/sub 7-delta/ (YBCO) high-temperature superconducting (HTS) thin films is presented. Results are shown for two different designs that were chosen to optimize the power-handling capability. Both filters have a 2-GHz center frequency and 5 poles that incorporate coupled resonators with 10-Omega internal impedances. They were made on 5-cm-diameter LaAlO/sub 3/ substrates. Both designs use parallel-coupled feed lines to avoid current crowding. The first design includes backward- and forward-coupled filters, has 1% bandwidth, and has handled over 25 watts of input power at 10 K with less than 0.25 dB compression. The second design has 1.2% bandwidth and uses only forward-coupled resonators. The dissipation loss is less than 0.2 dB at 45 K and it has a third-order intercept of 62 dBm. Another similar filter handled 36 watts of power at 45 K with less than 0.15 dB compression across the passband. We have developed a technique to visualize the power dissipation of the filter by observing the bubbles created by the filter when submerged in liquid helium, showing areas with local defects or where the current distribution is at its peak valne. We also discuss several planar high-power filter issues, including material selection and fabrication, device configuration trade-offs, filter structure optimization, and design approaches to maximize power-handling capacity.

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