Abstracts

A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

A. Silver, G. Akerling, R. Auten, D. Durand, J. Godden, K.-F. Lau, J. Murduck, R. Orsini, J. Raab, S. Schwarzbek, E. Tward and M. Wire. "A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1300-1307.

High temperature superconductors (HTS) promise to achieve electrical performance superior to that of conventional electronics. For application in space systems, HTS systems must simultaneously achieve lower power, weight, and volume than conventional electronics, and meet stringent space qualification and reliability requirements. Most effort to date has focused on passive RF/microwave applications. However, incorporation of active microwave components such as amplifiers, mixers, and phase shifters, and on-board high data rate digital signal processing is limited by the power and weight of their spacecraft electronic and support modules. Absence of data on active HTS components will prevent their utilization in space. To validate the feasibility in space of HTS circuits and components based on Josephson junctions, we need to demonstrate HTS circuits and critical supporting technologies, such as space-qualified packaging and interconnects, closed-cycle cryocooling, and interface electronics. This paper describes the packaging, performance, and space test plan of an integrated, space-qualified experimental package consisting of HTS Josephson junction circuits and all the supporting components for NRL's high temperature superconductor space experiment (HTSSE-II). Most of the technical challenges and approaches are equally applicable to passive and active RF/microwave and digital electronic components, and this experiment will provide valuable validation data.

❑ Return to main document.