Abstracts

Design Considerations for Monolithic Microwave Circuits

R.A. Pucel. "Design Considerations for Monolithic Microwave Circuits." 1981 Transactions on Microwave Theory and Techniques 29.6 (Jun. 1981, Part I [T-MTT]): 513-534.

Monolithic microwave integrated circuits based on silicon-on-sapphire (SOS) and gallium arsenide technologies are being considered seriously as viable candidates for satellite communication systems, airborne radar, and other applications. The low-loss properties of sapphire and semi-insulating GaAs substrates, combined with the excellent microwave performance of metal-semiconductor FET's (MESFET's), allows, for the first time, a truly monolithic approach to microwave integrated circuits. By monolithic we mean an approach wherein all passive and active circuit elements and interconnections are formed into the bulk, or onto the surface of the substrate by some deposition scheme, such as epitaxy, ion implantation, sputtering, evaporation, and other methods. The importance of this development is that microwave applications such as airborne phased-array systems based on a large number of identical circuits and requiring small physical volume and/or light weight, may, finally, become cost effective. The paper covers in some detail the design considerations that must be applied to monolithic microwave circuits in general, and to gallium arsenide circuits in particular. The important role being played by computer-aided design techniques is stressed. Numerous examples of monolithic circuits and components which illustrate the design principles are described. These provide a cross section of the world-wide effort in this field. A glimpse into the future prospects of monolithic microwave circuits is made.

❑ Return to main document.