Abstracts

Using MMIC flip chips and CVD diamond for improved thermal management of microwave modules

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MMIC flip chips offer several benefits over conventional face-up versions. This includes lower cost, ease of interconnection, self alignment to motherboard, and simultaneous attachment and electrical connection. High power MMIC flip chips use bumps on the FET source to provide for an improved thermal path. When connected to a high thermal conductivity mounting substrate such as aluminum nitride, high power flip chips operate at lower temperatures than conventional flip chips. In fact, modeling has shown that they can have a 15/spl deg/C lower junction temperature compared to conventional MMICs. However, it is often desirable to use lower thermal conductivity mounting substrates such as LTCC. In these cases the junction temperate of a MMIC, flipped or face-up, can be too high for practical use. By using Chemical Vapor Deposition (CVD) diamond substrates, it is possible to reduce the junction temperature to acceptable levels. This work describes the uses of diamond with MMIC flip chips on low thermal conductivity substrates.

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