ABSTRACT

Semiconductor Devices Including Voltage Switchable Materials For Over-Voltage Protection

Semiconductor devices are provided that employ voltage switchable materials for over-voltage protection. In various implementations, the voltage switchable materials are substituted for conventional die attach adhesives, underfill layers, and encapsulants. While the voltage switchable material normally functions as a dielectric material, during an over-voltage event the voltage switchable material becomes electrically conductive and can conduct electricity to ground. Accordingly, the voltage switchable material is in contact with a path to ground such as a grounded trace on a substrate, or a grounded solder ball in a flip-chip package.

Figure 1