

Abstract

A semiconductor device has a build-up interconnect structure. An opening is formed through the build-up interconnect structure. A peripheral wall structure is formed around the opening. A photonic semiconductor die is disposed over the build-up interconnect structure with a photonic circuit of the photonic semiconductor die aligned to the opening. A gap remains between the build-up interconnect structure and photonic semiconductor die over the peripheral wall structure. An underfill or encapsulant is deposited between the build-up interconnect structure and photonic semiconductor die.

(Fig. 21)