

Abstract

SEMICONDUCTOR DEVICE AND METHOD OF FORMING 3D INDUCTOR FROM PREFABRICATED PILLAR FRAME

A semiconductor device is made by mounting a semiconductor die over a carrier. A ferromagnetic inductor core is formed over the carrier. A prefabricated pillar frame is formed over the carrier, semiconductor die, and inductor core. An encapsulant is deposited over the semiconductor die and inductor core. A portion of the pillar frame is removed. A remaining portion of the pillar frame provides an interconnect pillar and inductor pillars around the inductor core. A first interconnect structure is formed over a first surface of the encapsulant. The carrier is removed. A second interconnect structure is formed over a second surface of the encapsulant. The first and second interconnect structures are electrically connected to the inductor pillars to form one or more 3D inductors. In another embodiment, a shielding layer is formed over the semiconductor die. A capacitor or resistor is formed within the first or second interconnect structures.

(Fig. 4)