

ABSTRACT

WIDE BAND GAP DEVICE INTEGRATED CIRCUIT ARCHITECTURE ON ENGINEERED SUBSTRATE

Disclosed herein are wide band gap integrated circuits, such as gallium nitride (GaN) integrated circuits, including a plurality of groups of epitaxial layers formed on an engineered substrate, and methods of making the WBG integrated circuits. The epitaxial layers have a coefficient of thermal expansion (CTE) substantially matching the CTE of the engineered substrate. Mesas, internal interconnects, and electrodes configure each group of epitaxial layers into a WBG device. External interconnects connect different WBG devices into a WBG integrated circuit. The CTE matching allows the formation of epitaxial layers with reduced dislocation density and an overall thickness of greater than 10 microns on a six-inch or larger engineered substrate. The large substrate size and thick WBG epitaxial layers allow a large number of high density WBG integrated circuits to be fabricated on a single substrate.

(Figure 7)