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A semiconductor device may include a first substrate structure including a plate layer, gate electrodes stacked on the plate layer, channel structures penetrating through the gate electrodes, and first bonding metal layers on the channel structures; and a second substrate structure connected to the first substrate structure, and including a substrate having active regions, device isolation layers in the substrate defining the active regions, circuit devices on one surface of the substrate, and second bonding metal layers connected to the first bonding metal layers, the device isolation layers including first device isolation layers and a second device isolation layer having different heights, and the active regions including first active regions spaced apart by the first device isolation layers and connected to each other by the substrate, and second active regions separated from the first active regions by the second device isolation layer.

