

ABSTRACT

A semiconductor device includes: a first substrate structure including a substrate and circuit elements and a second substrate structure on the first substrate structure, wherein the second substrate structure includes gate electrodes stacked in a first direction, interlayer insulating layers alternately stacked with the gate electrodes, channel structures that extend into the gate electrodes and respectively include a channel layer and a channel dielectric layer on a side surface of the channel layer, and a source structure that is on the channel structures and includes a horizontal region and a contact region extending from the horizontal region and contacting the channel layer, where the contact region extend into a portion of the channel dielectric layer of each of the channel structures, and a lower surface of the contact region is in contact with the channel structure and the interlayer insulating layer.

FIG. 2