

ABSTRACT

A semiconductor device includes a first stack structure including a first substrate, and a plurality of memory cells on the first substrate, and a second stack structure including a second substrate vertically overlapping the first substrate, and a plurality of peripheral circuit transistors on the second substrate, wherein the second stack structure includes a first via insulating layer passing through a part of the second substrate in a vertical direction, a second via insulating layer overlapping at least a portion of the first via insulating layer in the vertical direction and passing through other portions of the second substrate in the vertical direction, and a conductive through-via passing through the first via insulating layer and the second via insulating layer in the vertical direction.

FIG. 4A