

ABSTRACT OF THE DISCLOSURE

A semiconductor device includes gate electrodes stacked along a direction perpendicular to an upper surface of a substrate, the gate electrodes extending to different lengths in a first direction, and each gate electrode including subgate electrodes spaced apart from each other in a second direction perpendicular to the first direction, and gate connection portions connecting subgate electrodes of a same gate electrode of the gate electrodes to each other, channels extending through the gate electrodes perpendicularly to the upper surface of the substrate, and dummy channels extending through the gate electrodes perpendicularly to the upper surface of the substrate, the dummy channels including first dummy channels arranged in rows and columns, and second dummy channels arranged between the first dummy channels in a region including the gate connection portions.

FIG. 3