

ABSTRACT

A semiconductor device may include a semiconductor substrate including a horizontal portion and a vertical portion protruding upward from the horizontal portion, a bit line on the semiconductor substrate and extending in a first direction parallel to a bottom surface of the semiconductor substrate, a word line on the bit line and extending in a second direction parallel to the bottom surface of the semiconductor substrate that is different from the first direction, a semiconductor pattern on the vertical portion of the semiconductor substrate and extending in a third direction perpendicular to the bottom surface of the semiconductor substrate, and a metal silicide pattern between the semiconductor pattern and the bit line. The semiconductor pattern may include a source/drain region adjacent to the bit line and a channel region on the source/drain region, and the metal silicide pattern may be in contact with the source/drain region and the bit line.

FIG. 5A