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KANG et al.(10) **Pub. No.: US 2024/0215229 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **SEMICONDUCTOR DEVICE**(52) **U.S. Cl.**(71) Applicant: **Samsung Electronics Co., Ltd.,**
Suwon-si (KR)CPC **H10B 12/50** (2023.02); **H10B 12/01**
(2023.02); **H10B 12/315** (2023.02)(72) Inventors: **MINSUNG KANG**, Suwon-si (KR);
WONHEE CHO, Suwon-si (KR);
HYOUNGYOL MUN, Suwon-si (KR);
SUNG DONG CHO, Suwon-si (KR)(57) **ABSTRACT**

A semiconductor device may include a semiconductor layer on a substrate, a first insulating layer on the semiconductor layer, a first conductive structure, which is provided to penetrate the first insulating layer in a vertical direction perpendicular to a bottom surface of the substrate and is connected to the semiconductor layer, a second insulating layer covering the first insulating layer and the first conductive structure, a second conductive structure, which is provided to penetrate the second insulating layer in the vertical direction and is connected to the first conductive structure, and a diffusion barrier layer covering a top surface of the first insulating layer and extending to a side surface of the first conductive structure. The lowermost surface of the second conductive structure may be located at a height higher than the top surface of the first insulating layer.

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