

MAGNETIC TUNNEL JUNCTION BASED MEMORY DEVICE

ABSTRACT

A magnetic tunnel junction based memory device comprising a magnetic tunnel junction element and writing circuitry. The magnetic tunnel junction element includes a free layer, a pinned layer, and a tunnel barrier. The free layer is spaced apart along a vertical direction from the pinned layer by the tunnel barrier. The writing circuitry is configured to receive an instruction to set the magnetic tunnel junction element to a target state of three or more states of the magnetic tunnel junction element and provide electrical current to modify a position of a domain wall of the free layer along both a first horizontal direction and a second horizontal direction to correspond to the target state.

[Fig. 8]