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## Bi-directional Two Terminal Switching Device with Metal/P/N+ or Metal/N/P+ Junction

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We studied a bilateral switching device for spin transfer torque (STT-MRAM) based on 3D device simulation. Metal/P/N+ or Metal/N/P+ junction device with  $30 \times 30 \text{ nm}^2$  area which is composed of one side schottky junction at Metal/P/N+ and Metal/N/P+ provides sufficient bidirectional current flow to write data by a drain induced barrier lowering (DIBL). In this work, Junction device confirmed that write current is more than  $30 \text{ uA}$  at  $2 \text{ V}$ , It is also has high on-off ratio over 105 under read operation. Junction device has good process feasibility because metal material of junction device could have been replaced by bottom layer of MTJ. Therefore, additional process to fabricate two outer terminals is not need. so, it provides simple fabrication procedures. it is expected that Metal/P/N+ or Metal/N/P+ structure with one side schottky junction will be a promising switch device for beyond  $30 \text{ nm}$  STT-MRAM.

**Keywords:** Bilateral switching device, One side schottky junction