Current Status and Future Outlook of STT-RAM Technology

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Non-volatile STT-RAM (spin-transfer torque random access memory) is a new memory technology that combines the capacity and cost benefits of DRAM, the fast read and write performance of SRAM and the non-volatility of Flash with essentially unlimited endurance. It has excellent write selectivity, excellent scalability beyond the 45 nm technology node, low power consumption and a simpler architecture and manufacturing process than first-generation, field-switched MRAM. It has the potential to revolutionize the performance of electronic products in many areas, create new sectors in the semiconductor industry and give rise to entirely new products not yet envisaged.

This paper will describe the current status of STT-RAM memory technology, discuss the key technical issues involved in its commercialization, and outline future potential applications and products. Recent, dramatic advances in STT write current density reduction [1-3] have made it possible to design single-level STT-RAM unit cells as small as 6 F², where F is the minimum feature size, making STT-RAM's density not just superior to SRAM, but also competitive with DRAM and NOR Flash; ... distribution, thermal stability and data retention, MTJ barrier reliability and endurance, and read disturb. Finally, an analysis of STT-RAM scalability will be presented, outlining the trends in write current and thermal stability at the 45 nm technology node and beyond, and the future prospects for STT-RAM incorporating MTJs with perpendicular magnetic anisotropy (PMA) [5].

REFERENCES