

# **The Breakthrough in data retention time of DRAM using Recess-Channel-Array Transistor(RCAT) for 88nm feature size and beyond**

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## **Abstract**

For the first time, 512Mb DRAMs using a Recess-Channel-Array-Transistor(RCAT) are successfully developed with 88nm feature size, which is the smallest feature size ever reported in DRAM technology with nonplanar array transistor. The RCAT with gate length of 75nm and recessed channel depth of 150nm exhibits drastically improved electrical characteristics such as DIBL,  $BV_{DS}$ , junction leakage and cell contact resistance, comparing to a conventional planar array transistor of the same gate length. The most powerful effect using the RCAT in DRAMs is a great improvement of data retention time. In addition, this technology will easily extend to sub-70nm node by simply increasing recessed channel depth and keeping the same doping concentration of the substrate.