CYPRESS
eCT™ FLASH
THE MOST SCALABLE HIGH-PERFORMANCE, HIGH-RELIABILITY EMBEDDED FLASH SOLUTION FOR NEXT-GENERATION MCUS

INTRODUCTION

eCT (embedded Charge Trap) is a patented and proprietary NOR Flash technology that Cypress developed for high-performance MCUs with stringent reliability requirements. eCT has very attractive features for embedded Flash memory in automotive, industrial and consumer applications. eCT Flash is based on charge-trap technology that has been proven in volume production in six technology generations of MirroBit® NOR Flash memory. eCT is in volume production at the 40-nm node since 2016.

CELL OPERATION

eCT Flash bit cell uses a split-gate (1.5T) architecture in which one transistor is a Memory Gate (MG) that stores non-volatile data, and the other is a Select Gate (SG). The threshold voltage (Vt) of MG can be changed by adding or removing electric charge from the nitride layer of an Oxide-Nitride-Oxide (ONO) gate dielectric.

Using thin nitride layer to store electric charge makes the bit cell highly reliable and scalable. At the 40-nm node, eCT bit cell is approximately 25 percent smaller than the nearest competitor’s embedded Flash cell.

MG is programmed by channel hot electron injection (CHEI); threshold voltage is increased by injecting negative charges into the nitride layer.

Erase operation utilizes band-to-band tunneling (BTBT) hot-hole injection; threshold voltage is decreased by injecting positive charges into the nitride layer.

FEATURES

eCT FLASH:
• Delivers the smallest embedded Flash bit cell in the industry, 0.053 sq. μm, at the 40-nm node
• Enables easy scaling to the 28-nm node, in both PolySiON and HKMG variants
• Provides fast 8 ns random access time and fast 30-μs word-programming speed
• Provides 125,000 write endurance cycles
• Provides 20 years of data retention
• Meets Automotive Grade-1 reliability requirements
• Requires a low number of extra masks beyond the standard CMOS logic process
• Leaves CMOS transistor characteristics unchanged, preserving existing models and design IP
APPLICATIONS

eCT technology is used in numerous automotive MCUs, such as Traveo™ and Traveo™ II product families. These products serve a broad range of automotive applications including:

- Instrument clusters and head-up displays
- Hybrid and electrical vehicle motor control
- Body control modules and HVAC

eCT Flash is also well suited for industrial and consumer applications in which overall SoC performance and reliability are the predominant requirements, e.g.:

- Command and control modules in smart factories
- Power metering in smart grid
- Machine vision systems
- Test and measurement
- Electronic games

HIGHLIGHTS

eCT Flash delivers:

- High performance
  - 8-ns random access time
  - 30-μs word-programming speed
- High reliability
  - Automotive Grade-1 (AEC Q100 standard)
  - 125,000 write endurance cycles
  - 20 years of data retention
- Low manufacturing cost and excellent scalability
  - Industry-leading bit cell size at the 40-nm node
  - Low mask count
  - Simple structure and easy scaling to the 28-nm node
  - CMOS compatible; integrated into UMC 40LP/ulP logic process

GET STARTED NOW

For more details, please contact us at: ip_licensing@cypress.com

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**PRODUCT OVERVIEW**

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