Static Random Access

• Memory Classification
• CMOS static memory
  – Six transistor memory cell
  – Memory architecture
  – Decoders
  – Read/Write circuitry
• RMOS static memory
  – Four transistor memory cell
  – Technology
  – Memory cell layout
Memory Classification

Memories
  Other Memories
  Semiconductor Memories
    Other Memories
    Random Access Memories
      RAM
      Dynamic (DRAM)
      Static (SRAM)
    R/W Memories
      Read Only (ROM)
      Programmable (PROM)
    Electrically
      Erasable EPROM
    Flash Memories
CMOS static memory
Six transistor memory cell
CMOS static memory
Six transistor memory cell
CMOS static memory
Memory architecture

R/W CIRCUITRY
(SENS AMPLIFIERS)

COLUMN DECODERS

ROW DECODER

R0 R0
R1 R1
A0 A1

R2 R2
R3 R3
A0 A1

A2
A3
CMOS static memory
Decoders
CMOS static memory
Read/Write circuitry

Data in
W/R
From column decoder

Bit

Diff. Amplifier

Out

GND
CMOS static memory

Read

Bit

\[ \text{From column decoder} \]

\[ \text{Diff. Amplifier} \]

\[ \text{OUT} \]

Data in

W/R

GND
CMOS static memory

Write

Data in

W/R

From column decoder

GND

Bit

Bit

Diff. Amplifier

OUT
RMOS static memory

Four transistor memory cell
RMOS static memory Technology

x 128
RMOS static memory
Technology
RMOS static memory Technology

First polysilicon

\( (f) \)

First polysilicon

\( (g) \)
RMOS static memory Technology

LPCVD SiO₂

Sidewall oxide

n⁺
RMOS static memory
Technology
RMOS static memory
Technology
RMOS static memory
Technology
RMOS static memory Technology
RMOS static memory
Cell layout
RMOS static memory
Cell layout

Contact window
Window to the active region
Window to the first poly
RMOS static memory
Cell layout
RMOS static memory
Cell layout

- Nitride
- High resistivity second poly
- Second poly
- Contact between second poly and n+ region
RMOS static memory
Cell layout
RMOS static memory
Cell layout
RMOS static memory
Cell layout
RMOS static memory
Cell layout