DRAM

4 MEG x 4 DRAM

FAST PAGE MODE: MT4C40004
STATIC COLUMN: MT4C40005

FEATURES

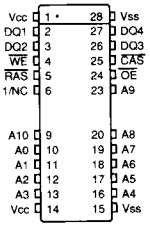
- Industry standard x4 pinout, timing, functions and packages
- High performance, CMOS silicon gate process
- Single power supply : +5V±10% or +3.3V±10%
- Low power, 5mW standby; 250mW active, typical
- All inputs, outputs and clocks are fully TTL and CMOS compatible
- Refresh modes: $\overline{RAS}$-ONLY, $\overline{CAS}$-BEFORE-$\overline{RAS}$ (CBR), and HIDDEN
- 2048-cycle refresh distributed across 32ms or 4096-cycle refresh distributed across 64ms

OPTIONS — MARKING

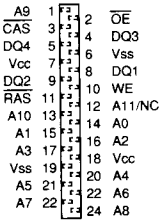
- Timing
  - 50ns access — -5
  - 60ns access — -6
  - 70ns access — -7
  - 80ns access — -8
- Packages
  - Plastic ZIP (475mil) — Z
  - Plastic SOJ (400mil) — DJ
  - Plastic TSOP (*) — TG
- Refresh Period
  - 2048 cycles @ 32ms — R
  - 4096 cycles @ 64ms — None
- Operating Temperature, T_A
  - Commercial (0°C to +70°C) — None
  - Industrial (-40°C to +85°C) — IT
- Power Supply
  - +5V±10% — None
  - +3.3V±10% — V

PIN ASSIGNMENT (Top View)

24-Pin SOJ (E-7)



24-Pin ZIP



*Consult factory on availablity of TSOP packages

GENERAL DESCRIPTION

The MT4C40004/5 are randomly accessed solid-state memories containing 16,777,216 bits organized in a x4 configuration. During READ or WRITE cycles, each bit is uniquely addressed through the 22 address bits, which are entered 10-12 bits (A0-A11) at a time. $\overline{RAS}$ is used to latch the first 11/12 bits and $\overline{CAS}$ the latter 10/11 bits. A READ or WRITE cycle is selected with the $\overline{WE}$ input. A logic HIGH on $\overline{WE}$ dictates READ mode while a logic LOW on $\overline{WE}$ dictates WRITE mode. During a WRITE cycle, data in (D) is latched by the falling edge of $\overline{WE}$ or $\overline{CAS}$, whichever occurs last. If $\overline{WE}$ goes LOW prior to $\overline{CAS}$ going LOW, the output pins remain open (High- Z) until the next $\overline{CAS}$ cycle. If $\overline{WE}$ goes LOW after data reaches the output pins, data out (Q), is activated and retains the selected cell data as long as $\overline{CAS}$ remains LOW (regardless of $\overline{WE}$ or $\overline{RAS}$). This late $\overline{WE}$ pulse results in a READ-WRITE cycle. The four data inputs and the four data outputs are routed through four pins using common I/O, and pin direction is controlled by $\overline{WE}$ and $\overline{OE}$.

FAST PAGE MODE operations allow faster data operations (READ, WRITE or READ-MODIFY-WRITE) within a row address (A0-A10/11) defined page boundary. The FAST PAGE MODE cycle is always initiated with a row address strobed-in by $\overline{RAS}$ followed by a column address strobed-in by $\overline{CAS}$. $\overline{CAS}$ may be toggled-in by holding $\overline{RAS}$ LOW and strobing-in different column addresses, thus executing faster memory cycles. Returning $\overline{RAS}$ HIGH terminates the FAST PAGE MODE operation.

Returning $\overline{RAS}$ and $\overline{CAS}$ HIGH terminates a memory cycle and decreases chip current to a reduced standby level. Also, the chip is preconditioned for the next cycle during the $\overline{RAS}$ high time. Memory cell data is retained in its correct state by maintaining power and executing any $\overline{RAS}$ cycle (READ, WRITE, $\overline{RAS}$-ONLY, $\overline{CAS}$-BEFORE-$\overline{RAS}$ (CBR), or HIDDEN refresh) so that all 2048/4096 combinations of $\overline{RAS}$ addresses (A0-A10/A11) are executed at least every 32ms/64ms, regardless of sequence. The CBR refresh cycle will invoke the refresh counter for automatic $\overline{RAS}$ addressing.

The MT4C40004/5 are available with either 2048 cycles or 4096 cycles of refreshing. If CBR refresh is used, the number of cycles is a "don't care."