UMC

UMC

PRELIMINARY

# UM23C1025-A/-B

## 131,072× 8 BIT CMOS MASK-PROGRAMMABLE ROM

### Features

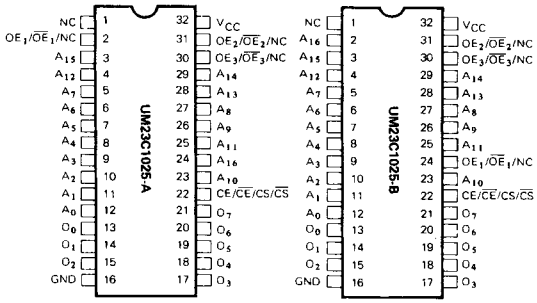
- 131,072 x 8-bit organization
- Single +5V power supply
- Access times: 120/150 ns (max.)
- Current: Operating: 40 mA (max.)
  Standby: 50 μA (max.)
- 3-state outputs for wired-OR expansion
- Fully static operation
- TTL-compatible inputs and outputs
- Mask programmed for
  CE/$\overline{CE}$ or CS/$\overline{CS}$
  $OE_1$ or $\overline{OE_1}$ or NC
  $OE_2$ or $\overline{OE_2}$ or NC
  $OE_2$ or $\overline{OE_3}$ or NC
- Available in 32 pin DIP packages

### General Description

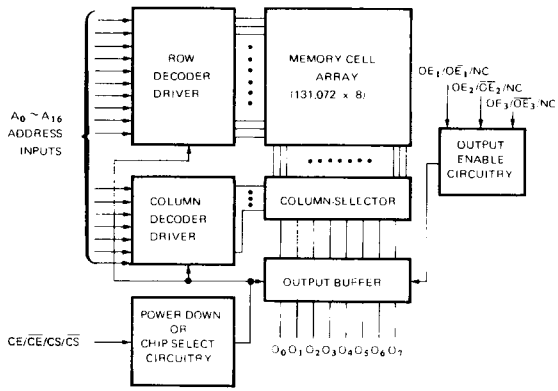
The UM23C1025-A/-B is a 131,072 word by 8 bit EPROM-Compatible Read-Only-Memory. It is designed to be compatible with all microprocessors and similar applications where high performance large-bit storage and similar interfacing are important design considerations.

The UM23C1025-A/-B offers automatic powerdown controlled by the Chip Enable CE/$\overline{CE}$ input. When $\overline{CE}$ goes HIGH (CE goes LOW), the device will automatically power down and remain in a low power standby mode as long as $\overline{CE}$ remains HIGH (CE remains LOW). This feature provides system level power savings as much as 99%. Pin 22 may also be mask programmed as CS/$\overline{CS}$. An additional feature of UM23C1025-A/-B is the Output Enable $OE_1$, $OE_2$, $OE_3$ functions (may be mask programmed as OE/$\overline{OE}$/NC) in order to eliminate bus contention in multiple bus microprocessor systems.

### Pin Configurations




### Block Diagram



## Pin Description

| Pin No. | Symbol | Description |
|---|---|---|
| 3-12, 23 25-29 | $A_0 - A_{15}$ | Address Input |
| 13-15, 17-21 | $O_0 - O_7$ | Data Output |
| 16 | GND | Ground |
| 32 | $V_{CC}$ | Power Supply |
| 1 | NC | No Connection |
| 22 | CS/$\overline{CS}$/CE/$\overline{CE}$ | Chip Select/Chip Enable Input (Note 1) |
| 2 | $OE_1/\overline{OE_1}$/NC (-A) | Output Enable 1 (Note 2) |
| | $A_{16}$ (–B) | Address Input |
| 24 | $A_{16}$ (–A) | Address Input |
| | $OE_1/\overline{OE_1}$/NC (-B) | Output Enable 1 (Note 2) |
| 31 | $OE_2/\overline{OE_2}$/NC | Output Enable 2 (Note 2) |
| 30 | $OE_3/\overline{OE_3}$/NC | Output Enable 3 (Note 2) |

Notes:
(1) This pin is user-definable as active high or active low.
(2) NC is "No Connection".

## Recommended DC Operating Conditions

($T_A$ = 0°C to +70°C)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply Voltage | 4.5 | 5.0 | 5.5 | V |
| GND | Supply Voltage | 0 | 0 | 0 | V |
| $V_{IH}$ | Input High Voltage | 2.2 | | $V_{CC}$ + 0.3 | V |
| $V_{IL}$ | Input Low Voltage | –0.5 | | 0.8 | V |

## Absolute Maximum Ratings*

Operating Temperature . . . . . –10 to +80°C
Storage Temperature . . . . . –65 to +150°C
Supply Voltage to Ground Potential . . . . . –0.5 to +7.0V
Output Voltage . . . . . –0.5 to $V_{CC}$ + 0.5V
Input Voltage . . . . . –0.5 to $V_{CC}$ + 0.5V
Power Dissipation . . . . . 400 mW

## *Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## DC Electrical Characteristics

($T_A$ = 0°C to +70°C, $V_{CC}$ = 5.0V ± 10%, GND = 0V)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $V_{OH}$ | Output High Voltage | 2.4 | | | V | $I_{OH}$ = –1.0 mA |
| $V_{OL}$ | Output Low Voltage | | | 0.4 | V | $I_{OL}$ = 3.2 mA |
| $V_{IH}$ | Input High Voltage | 2.2 | | $V_{CC}$ + 0.3 | V | |
| $V_{IL}$ | Input Low Voltage | –0.5 | | 0.8 | V | |
| $\|I_{LI}\|$ | Input Leakage Current | | | 10 | μA | $V_{IN}$ = 0V to $V_{CC}$ |
| $\|I_{LO}\|$ | Output Leakage Current | | | 10 | μA | $V_{OUT}$ = 0V to $V_{CC}$ |

## DC Electrical Characteristics (Continued)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $I_{CC}$ | Operating Supply Current | | | 40 | mA | $\overline{CE}/\overline{CS} = V_{IL}$<br>$CE/CS = V_{IH}$ |
| $I_{SB}$ | Standby Supply Current | | | 1.5 | mA | $\overline{CE} = V_{IH}$<br>$CE = V_{IL}$ |
| $I_{SB1}$ | Standby Supply Current | | | 50 | μA | $\overline{CE} = V_{CC} - 0.2V$<br>$CE = 0.2V$ |

## Capacitance:

| Symbol | Parameter | Min. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| $C_I$* | Input Capacitance | | 10 | pF | $T_A = 25°C$ |
| $C_O$* | Output Capacitance | | 10 | pF | f = 1.0 MHz |

*This parameter is periodically sampled and is not 100% tested. All pins except pin under test tied to AC ground.

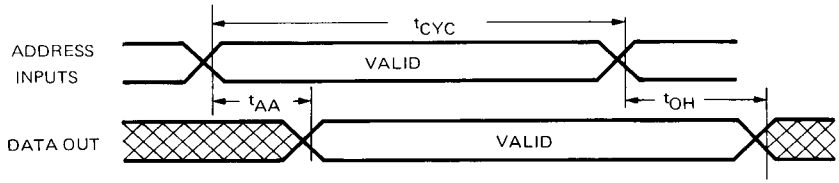
## AC Characteristics ($T_A = 0°C$ to $+70°C$, $V_{CC} = 5.0V \pm 10\%$, GND = 0V)

| Symbol | Parameter | UM23C1025-A/-B/-12 | | UM23C1025-A/-B/-15 | | Unit |
|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | |
| $t_{CYC}$ | Cycle Time | 120 | | 150 | | ns |
| $t_{AA}$ | Address Access Time | | 120 | | 150 | ns |
| $t_{ACE}$ | Chip Enable Access Time | | 120 | | 150 | ns |
| $t_{ACS}$ | Chip Select Access Time | | 85 | | 100 | ns |
| $t_{AOE}$ | Output Enable Access Time | | 60 | | 90 | ns |
| $t_{OH}$ | Output Hold After Address Change | 10 | | 10 | | ns |
| $t_{LZ}$ | Output Low Z Delay | 10 | | 10 | | ns |
| $t_{HZ}$ | Output High Z Delay* | | 50 | | 50 | ns |
| $t_{PU}$ | Power-Up Time | 0 | | 0 | | ns |
| $t_{PD}$ | Power-Down Time | | 50 | | 50 | ns |

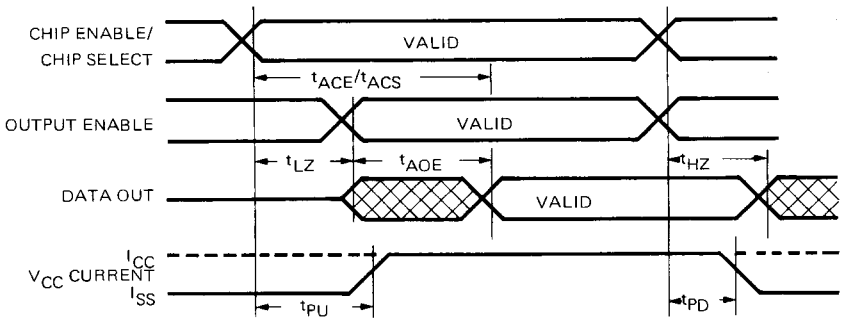
*$t_{HZ}$ is specified from either OE/$\overline{OE}$ or CE/$\overline{CE}$ going disabled or CS/$\overline{CS}$ going inactive, whichever occurs first.

## Timing Waveforms

**Propagation Delay From Address (CE/$\overline{CE}$ going enabled or CS/$\overline{CS}$ going active)**

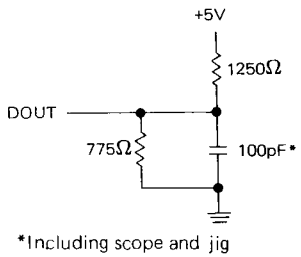



**Propagation Delay From Chip Enable or Chip Select or Output Enable (Address Valid)**




### AC Test Conditions

| | |
|---|---|
| Input Pulse Levels | 0.4 – 2.4V |
| Input Rise and Fall Time | 10 ns |
| Timing Measurement Reference Level | $V_{IL}$ = 0.8V $V_{IH}$ = 2.2V<br>$V_{OL}$ = 0.8V $V_{OH}$ = 2.0V |
| Output Load | See Fig. 1 |




*Including scope and jig

**Fig. 1 Output Load Circuit**

## Functions

### Truth Table (UM23C1025-A)

| CE | $OE_1$ (Pin 2) | $OE_2$ | $OE_3$ | $O_0 - O_7$ | Mode |
|---|---|---|---|---|---|
| A | A | A | A | Output Data | Read |
| I | X | X | X | HI – Z | Power Down |
| A | I | X | X | HI – Z | Output Disable |
| A | X | I | X | HI – Z | Output Disable |
| A | X | X | I | HI – Z | Output Disable |

### Truth Table (UM23C1025-B)

| CE | $OE_1$ (Pin 24) | $OE_2$ | $OE_3$ | $O_0 - O_7$ | Mode |
|---|---|---|---|---|---|
| A | A | A | A | Output Data | Read |
| I | X | X | X | HI – Z | Power Down |
| A | I | X | X | HI – Z | Output Disable |
| A | X | I | X | HI – Z | Output Disable |
| A | X | X | I | HI – Z | Output Disable |

1. CE/$\overline{CE}$, $OE_1$/$\overline{OE_1}$/NC, $OE_2$/$\overline{OE_2}$/NC, $OE_3$/$\overline{OE_3}$/NC are mask programmable which can be selected for active low, active high or no connection.
2. "A" means "Active." "I" means "Inactive". "X" means "Active" or "Inactive."
3. If OE/$\overline{OE}$/NC is set to no-connection, the input level will be internally fixed at active level.

## Ordering Information

| Part No. | Access Time (ns) | Operating Current Max. (mA) | Standby Current Max. (mA) | Package |
|---|---|---|---|---|
| *UM23C1025-A/-12 | 120 | 40 | 0.05 | 32L DIP |
| *UM23C1025-A/-15 | 150 | 40 | 0.05 | 32L DIP |
| UM23C1025-B/-12 | 120 | 40 | 0.05 | 32L DIP |
| UM23C1025-B/-15 | 150 | 40 | 0.05 | 32L DIP |

*The UM23C1025-A is EPROM-compatible.