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UMC

# UM23C1024

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



### Features

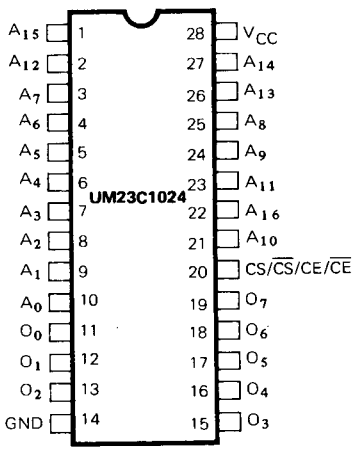
- 131,072 x 8-bit organization
- Single +5V power supply
- Access times: 150/200 ns (max.)
- Current:
  Operating: 40 mA (max.)
  Standby: 30 μA (max.)
- 3-state outputs for wired-OR expansion
- Mask programmed for Chip Enable (Powerdown) CE/$\overline{CE}$ or Chip Select CS/$\overline{CS}$
- Fully static operation
- TTL-compatible inputs and outputs
- Available in 28 pin DIP package (UM23C1024) or in 28 pin SOP package (UM23C1024M)

### General Description

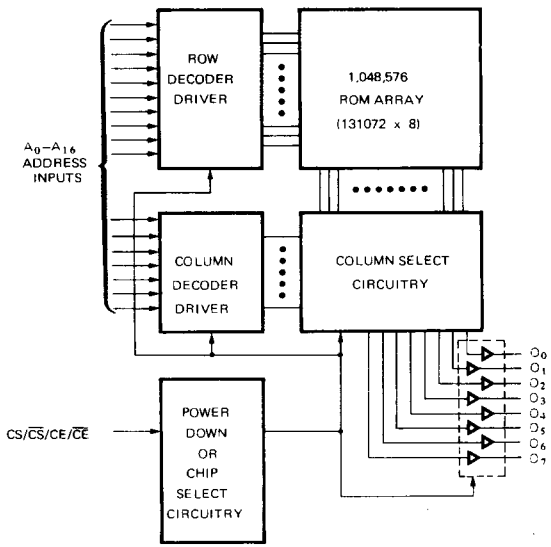
The UM23C1024 high-performance Read Only Memory is organized 131,072 words by 8 bits. It is designed to be compatible with all microprocessors and similar applications where high-performance large-bit storage and simple interfacing are important design considerations.

The UM23C1024 offers automatic powerdown controlled by the Chip Enable CE/$\overline{CE}$ input. When CE/$\overline{CE}$ goes LOW/HIGH, the device will automatically power down and remain in a low power standby mode as long as CE/$\overline{CE}$ remains LOW/HIGH. Pin 20 may also be mask programmed as CS/$\overline{CS}$ (active HIGH or LOW) in order to eliminate bus contention in multiple bus microprocessor systems.

### Pin Configuration




### Block Diagram

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## Pin Description

| Pin No. | Symbol | Description |
|---|---|---|
| 1-10, 21-27 | $A_0 - A_{16}$ | Address Input |
| 11-13, 15-19 | $O_0 \sim O_7$ | Data Output |
| 14 | GND | Ground |
| 28 | $V_{CC}$ | Power supply |
| 20 | CS/$\overline{CS}$/CE/$\overline{CE}$ | Chip Select/Chip Enable Input |

## 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 | 0.8 | V |

## Absolute Maximum Ratings *

Ambient 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 . . . . . 300 mW
Soldering Temp. & Time . . . . . 260°C, 10 sec

## *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 | Note |
|---|---|---|---|---|---|---|---|
| $V_{OH}$ | Output HIGH Voltage | 2.4 | | $V_{CC}$ | 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 $V_{CC}$ | 1 |
| $I_{CC}$ | Operating Supply Current | | | 40 | mA | | 2 |
| $I_{SB}$ | Standby Supply Current | | | 1.0 | mA | $\overline{CE}$ = $V_{IH}$, CE = $V_{IL}$ | |
| $I_{SB1}$ | Standby Supply Current | | | 30 | μA | $\overline{CE}$ = $V_{CC}$–0.2V, CE = 0.2V | |

## Capacitance:

| Symbol | Parameter | Min. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $C_I$ | Input Capacitance | | 10 | pF | $T_A$ = 25°C | 3 |
| $C_O$ | Output Capacitance | | 10 | pF | f = 1.0 MHz | |

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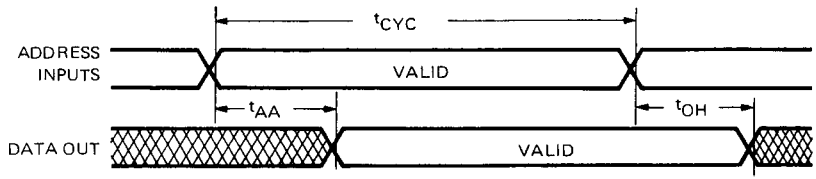
## AC Characteristics ($T_A$ = 0°C to +70°C, $V_{CC}$ = 5.0V ± 10%, GND = 0V)

| Symbol | Parameter | UM23C1024-15 | | UM23C1024-20 | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | | |
| $t_{CYC}$ | Cycle Time | 150 | | 200 | | ns | |
| $t_{AA}$ | Address Access Time | | 150 | | 200 | ns | |
| $t_{ACE}$ | Chip Enable Access Time | | 150 | | 200 | ns | |
| $t_{ACS}$ | Chip Select Access Time | | 85 | | 100 | ns | |
| $t_{OH}$ | Output Hold After Address Change | 10 | | 10 | | ns | |
| $t_{LZ}$ | Output LOW Z Delay | 10 | | 10 | | ns | 4 |
| $t_{HZ}$ | Output HIGH Z Delay | | 85 | | 100 | ns | 5 |
| $t_{PU}$ | Power-Up Time | 0 | | 0 | | ns | |
| $t_{PD}$ | Powerdown Time | | 85 | | 100 | ns | |

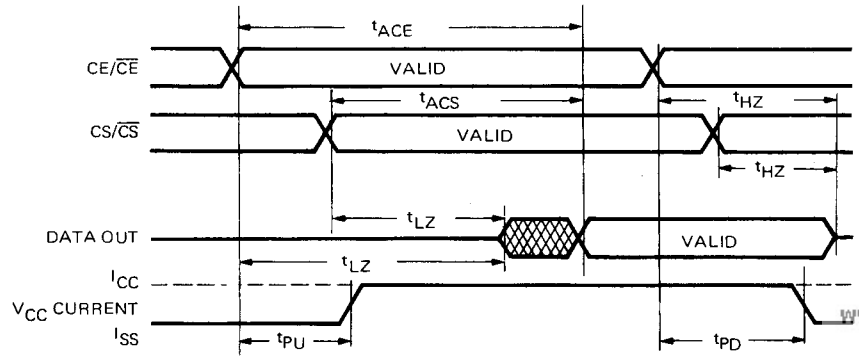
Notes:
1. CS/CE = $V_{IL}$, $\overline{CS}/\overline{CE}$ = $V_{IH}$ (Output is unloaded)
2. $V_{IN}$ = $V_{IH}/V_{IL}$, But CS/CE = $V_{IH}$, $\overline{CS}/\overline{CE}$ = $V_{IL}$ (Output is unloaded)
3. This parameter is periodically sampled and is not 100% tested. All pins except pin under test tied to AC ground.
4. Output LOW impedance delay ($t_{LZ}$) is measured from CE/$\overline{CE}$ or CS/$\overline{CS}$ going active.
5. Output HIGH impedance delay ($t_{HZ}$) is measured from CE/$\overline{CE}$ or CS/$\overline{CS}$ going inactive.

### Timing Waveforms

PROPAGATION DELAY FROM ADDRESS (CE/$\overline{CE}$ = ACTIVE, CS/$\overline{CS}$ = ACTIVE)




PROPAGATION DELAY FROM CHIP ENABLE, OR CHIP SELECT (ADDRESS VALID)

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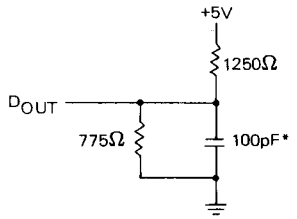
## AC Test Conditions

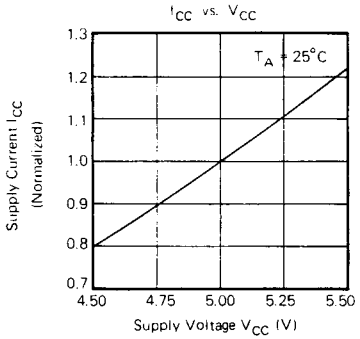
| | |
|---|---|
| Input Pulse Levels | 0.4 – 2.4V |
| Input Rise and Fall Times | 10ns |
| Timing Measurement Reference Level | $V_{IL}$ = 0.8V $V_{IH}$ = 2.2V<br>$V_{OL}$ = 0.8V $V_{OH}$ = 2.0V |
| Output Load | See Figure 1 |

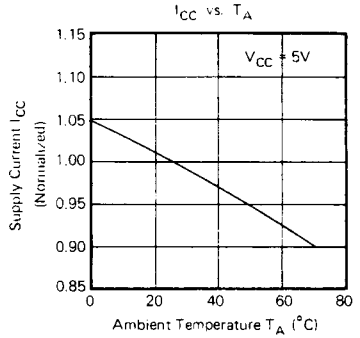


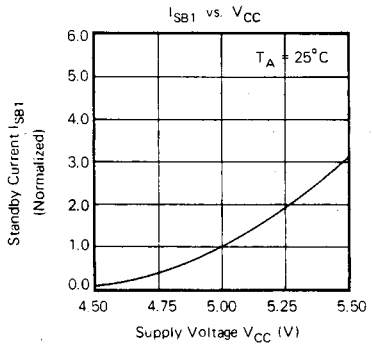

* Including scope and jig

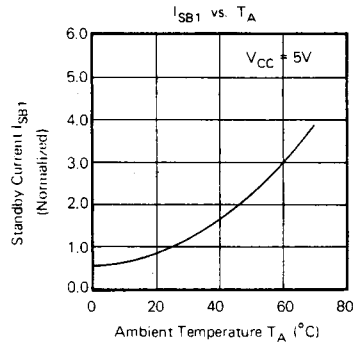
**Figure 1 Output Load Circuit**

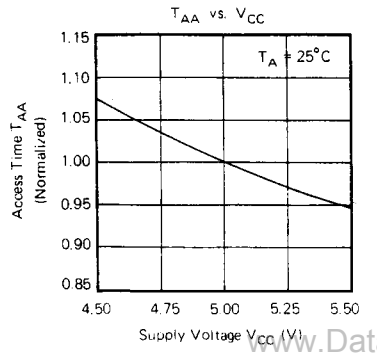
## Characteristic Curves

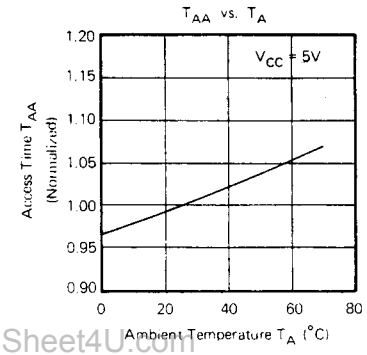
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## Ordering Information

| Part No. | Access Time (ns) | Operating Current Max. (mA) | Standby Current Max. (mA) | Package |
|---|---|---|---|---|
| UM23C1024–15 | 150 | 40 | 0.03 | 28L DIP |
| UM23C1024M–15 | | | | 28L SOP |
| UM23C1024–20 | 200 | 40 | 0.03 | 28L DIP |
| UM23C1024M–20 | | | | 28L SOP |

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