



## UM23C128-A/-B

### 16,384 × 8-BIT CMOS MASK-PROGRAMMABLE ROM

#### Features

- 16,384 × 8-bit organization
- Single +5V power supply
- Access time: 150 ns (max.)
- Current: Operating: 30 mA (max.)  
Standby: 30  $\mu$ A (max.)
- Mask Programmed for chip enable (powerdown)  $\overline{CE}/\overline{CE}$  and chip select  $\overline{CS}$
- 3-state outputs for wired-OR expansion
- Fully static operation
- TTL-compatible inputs and outputs
- Available in 28 pin DIP packages (UM23C128-A/-B) or in chip form (UM23C128H-A/-B)

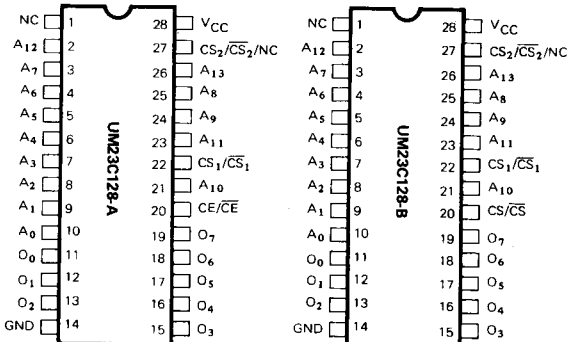
#### General Description

The UM23C128-A/-B is a high performance Read Only Memory organized 16,384 words by 8 bits with an access time of 150 ns. 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.

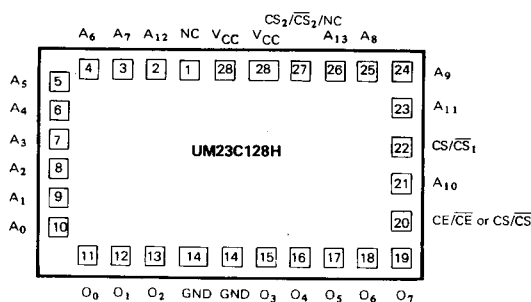
The UM23C128-A offers automatic powerdown with powerdown controlled by the Chip Enable  $\overline{CE}/\overline{CE}$  input.

When  $\overline{CE}/\overline{CE}$  goes LOW/HIGH, the device will automatically power down and remain in a low power standby mode as long as  $\overline{CE}/\overline{CE}$  remains LOW/HIGH. This unique feature provides system level power savings of as much as 99%. The functions of Pin 22 and Pin 27 are  $\overline{CS}_1/\overline{CS}_1$  and  $\overline{CS}_2/\overline{CS}_2/\overline{NC}$ , respectively. For UM23C128-B, Pin 20 may also be programmed as  $\overline{CS}/\overline{CS}$  (active HIGH or LOW) in order to eliminate bus contention in multiple bus micro-processor systems.

#### Pin Configurations

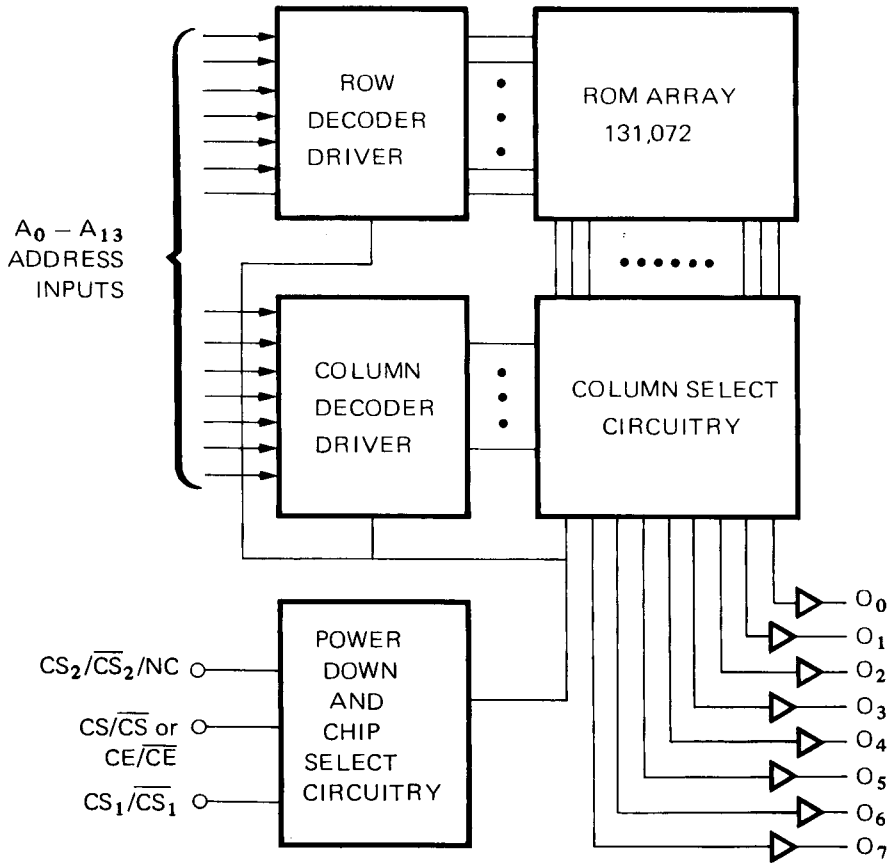


#### Pad Configuration





Block Diagram



Mask ROM

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## Pin Description

Pin No.	Symbol	Description	
2-10, 21, 23-26	$A_0-A_{13}$	Address Input	
11-13, 15-19	$O_0-O_7$	Data Output	
14	GND	Ground	
28	$V_{CC}$	Power Supply	
20	-A	CE/ $\overline{CE}$	Chip Enable Input
	-B	CS/ $\overline{CS}$	Chip Select Input
22	$CS_1/\overline{CS}_1$	Chip Select Input	
27	$CS_2/\overline{CS}_2/NC$	Chip Select or No Connection	

## 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	400 mW

## Recommended DC Operating Conditions

(T<sub>A</sub> = 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

## \*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<sub>A</sub> = 0°C to +70°C, V<sub>CC</sub> = 5.0V ± 10%, GND = 0V)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{OH}$	Output HIGH Voltage	2.4		$V_{CC}$	V	$I_{OH} = -1\text{ mA}$	
$V_{OL}$	Output LOW Voltage			0.4	V	$I_{OL} = 3.2\text{ mA}$	
$V_{IH}$	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	$V_{IN} = 0V\text{ to }V_{CC}$	
$ I_{LO} $	Output Leakage Current			10	μA	$V_{OUT} = 0V\text{ to }V_{CC}$	
$I_{CC}$	Operating Supply Current		10	30	mA		1
$I_{SB}$	Standby Supply Current		0.2	1.5	mA	$\overline{CE} = V_{IH}, CE = V_{IL}$	
$I_{SB1}$	Standby Supply Current		10	30	μA	$CE = V_{CC} - 0.2V,$ $CE = 0.2V$	
$I_{OS}$	Output Short Circuit Current			70	mA		2

## Capacitance:

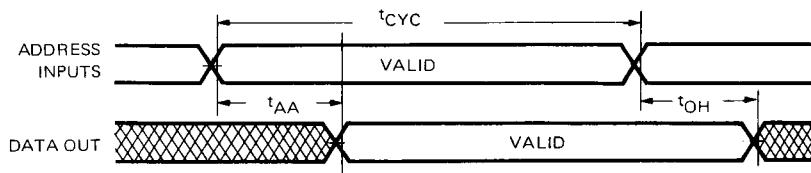
Symbol	Parameter	Min.	Max.	Unit	Test Conditions	Note
$C_I$	Input Capacitance		10	pF	T <sub>A</sub> = 25°C f = 1.0 MHz	3
$C_O$	Output Capacitance		10	pF		


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

Symbol	Parameter	Min.	Max.	Unit	Note
$t_{CYC}$	Cycle Time	150		ns	
$t_{AA}$	Address Access Time		150	ns	
$t_{ACE}$	Chip Enable Access Time		150	ns	
$t_{ACS}$	Chip Select Access Time		70	ns	
$t_{OH}$	Output Hold After Address Change	10		ns	
$t_{LZ}$	Output Low Z Delay	10		ns	4
$t_{HZ}$	Output High Z Delay		70	ns	5
$t_{PU}$	Power-Up Time	0		ns	
$t_{PD}$	Power-Down Time		85	ns	

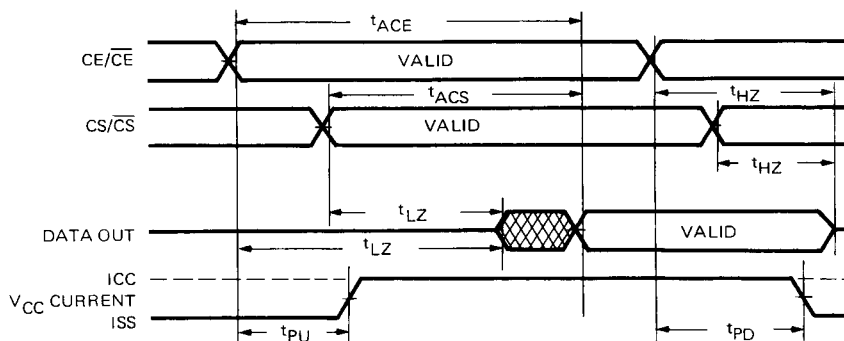
## Notes:

1. Measured with device selected and output unloaded.
2. For a duration not to exceed 30 seconds.
3. This parameter is periodically sampled and is not 100% tested. All pins except for pins under test are tied to ground.
4. Output LOW impedance delay ( $t_{LZ}$ ) is measured from the later of  $\text{CE}/\overline{\text{CE}}$  or  $\text{CS}/\overline{\text{CS}}$  going active.
5. Output HIGH impedance delay ( $t_{HZ}$ ) is measured from the earlier of  $\text{CE}/\overline{\text{CE}}$  or  $\text{CS}/\overline{\text{CS}}$  going inactive.

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


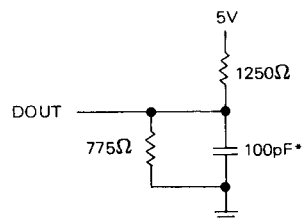


## PROPAGATION DELAY FROM CHIP ENABLE, OR CHIP SELECT (ADDRESS VALID)



## AC Test Conditions

Input Pulse Levels	0.4 ~ 2.4V
Input Rise And Fall Times	10 ns
Timing Measurement Reference Level	$V_{IL} = 0.8V$ $V_{IH} = 2.2V$ $V_{OL} = 0.8V$ $V_{OH} = 2.0V$
Output Load	See Figure 1



\*INCLUDING SCOPE AND JIG

Figure 1 Output Load Circuit

## Functions

## Truth Table (UM23C128-A)

CE	CS <sub>1</sub>	CS <sub>2</sub>	O <sub>0</sub> - O <sub>7</sub>	Mode
I	X	X	HI-Z	Power Down
A	I	X	HI-Z	Output Disable
A	X	I	HI-Z	Output Disable
A	A	A	Output Data	Read

## Truth Table (UM23C128-B)

CS	CS <sub>1</sub>	CS <sub>2</sub>	O <sub>0</sub> - O <sub>7</sub>	Mode
I	X	X	HI-Z	Output Disable
X	I	X	HI-Z	Output Disable
X	X	I	HI-Z	Output Disable
A	A	A	Output Data	Read

## Read Mode

- Data can be read in case of setting address, CS<sub>1</sub> = A, CS<sub>2</sub> = A, CE = A (UM23C128-A) and CS = A, CS<sub>1</sub> = A, CS<sub>2</sub> = A (UM23C128-B).
- CS<sub>2</sub>/CS<sub>2</sub>/NC, CS<sub>1</sub>/CS<sub>1</sub>, CE/CE-bar are mask programmable which can be selected for either active level. When ordering, please specify -A or -B and the active level CS/CS/NC, CE/CE-bar/CS/CS.

- "A" means "Active".  
"I" means "Inactive".  
"X" means "Active" or "Inactive".
- If Pin 27 is set to no-connection, the Input level will be internally fixed at active level.



## UM23C128-A/-B

### Ordering Information

Part No.	Access Time (ns)	Operating Current Max. (mA)	Standby Current Max. (mA)	Package	Power Down
UM23C128-A	150	30	0.03	28L DIP	YES
UM23C128H-A				Chip Form	YES
UM23C128-B	150	30	0.03	28L DIP	NO
UM23C128H-B				Chip Form	NO

Mask ROM