



MX23L4000

4M-BIT [512Kx8] LOW VOLTAGE OPERATION CMOS MASK ROM

FEATURES

- 512K x 8 organization
- Wide power supply range, 2.7 to 3.6 volt operation
- Fast access time:150/200ns
- Totally static operation
- Completely TTL compatible
- Operating current: 20mA
- Standby current: 5uA
- Package type:
 - 32 pin SOP
 - 32 pin TSOP

GENERAL DESCRIPTION

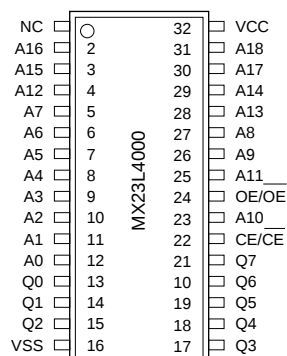
The MX23L4000 is a low voltage, 4M-bit, Read Only Memory. It is organized as 512K words by 8 bit, operates from 2.8 to 3.6 volt supply, has a static standby mode, and has an access time of 200ns. It is designed to be compatible with all microprocessors and similar applications in which high performance, large bit storage and simple interfacing are important design considerations.

The MX23L4000 offers automatic power-down, with power-down controlled by the chip enable ($\overline{CE}$) input. When $\overline{CE}$ goes high, the device automatically powers down and remains in a low-power standby mode as long as $\overline{CE}$ stays in the unselected mode.

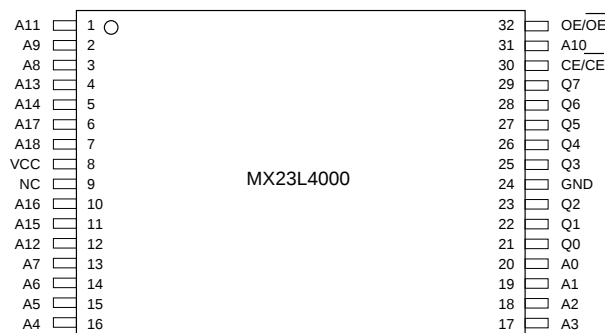
MX23L4000 pin 24 may also be programmed either active HIGH or LOW in order to eliminate bus contention in multiple-bus microprocessor systems.

PIN CONFIGURATION

32 SOP



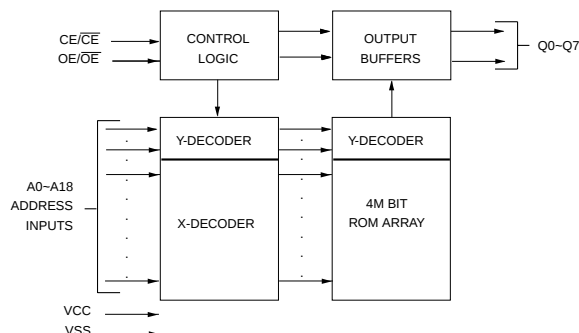
32 TSOP



PIN DESCRIPTION

Symbol	Pin Function
A0~A18	Address Input
Q0~Q7	Data Output
CE/ $\overline{CE}$	Chip Enable Input
OE/ $\overline{OE}$	Output Enable Input
VCC	Power Supply Pin (+5V)
VSS	Ground Pin

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

RATING	VALUE
Ambient Operating Temperature	-40°C to 80°C
Storage Temperature	-65°C to 125°C
Applied Input Voltage	-0.3V to VCC+0.3V
Applied Output Voltage	-0.3V to VCC+0.3V
VCC to Ground Potential	-0.3V to 7.0V
Power Dissipation	1.0W

***Notice:**

Stress greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended period may affect reliability.

DC CHARACTERISTICS (Ta = -40°C ~ 80°C, VCC = 2.7V to 3.6V)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	VCC-0.2	-	IOH = -0.5mA
Output Low Voltage	VOL	-	0.2V	IOL = 0.5mA
Input High Voltage	VIH	0.8VCC	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.4V	
Input Leakage Current	ILI	-	±1.0uA	VIN=0 to VCC
Output Leakage Current	ILO	-	±1.0uA	VOUT=0 to VCC
Power-Down Supply Current	ICC3	-	5uA	$\overline{CE}$ >VCC-0.2V
Standby Supply Current	ICC2	-	50uA	$\overline{CE}$ = VIH
Operating Supply Current	ICC1	-	20mA	VCC=3V, f=5MHz

CAPACITANCE (Ta = 25°C, f=1.0MHz (Note 2))

Item	Symbol	TYP.	MAX.	UNIT	Conditions
Input Capacitance	CIN		8	pF	VIN=0V
Output Capacitance	COUT		10	pF	VOUT=0V

AC CHARACTERISTICS (Ta = 0 °C ~ 70 °C, VCC = VCC = 2.7V to 3.6V)

Item	Symbol	23L4000-15		23L4000-20		CONDITIONS
		MIN.	MAX.	MIN.	MAX.	
Cycle Time	tCYC	150ns	-	200ns	-	
Address Access Time	tAA	-	150ns	-	200ns	
Output Hold Time After Address Change	tOH	0ns	-	0ns	-	
Chip Enable Access Time	tACE	-	150ns	-	200ns	
Output Enable/Chip Select Access Time	tAOE	-	60ns	-	80ns	
Output Low Z Delay	tLZ	0ns	-	0ns	-	Note 3
Output High Z Delay	tHZ	-	50ns	-	50ns	Note 4

Note:

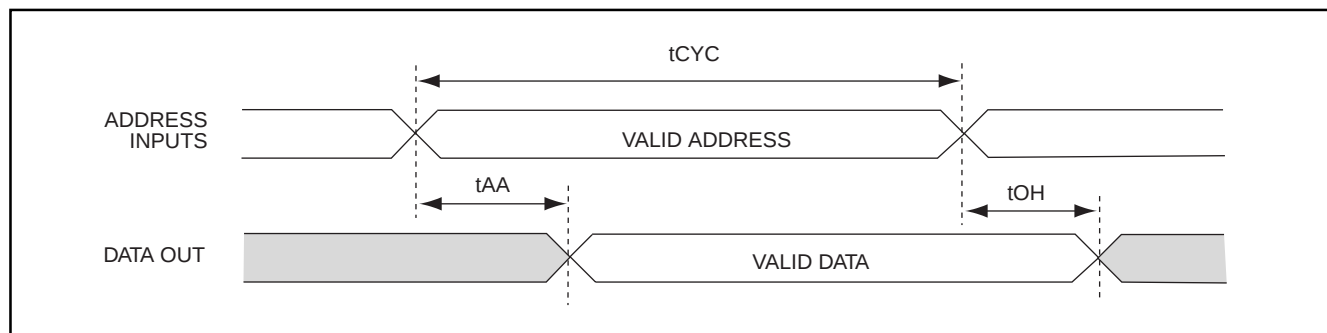
1. Measured with device selected at f=5 MHz and output unloaded.
2. This parameter is periodically sampled and is not 100% tested.
3. Output low-impedance delay (tLZ) is measured from $\overline{CE}$ going low.
4. Output high-impedance delay (tHZ) is measured from $\overline{CE}$ going high.

AC Test Conditions

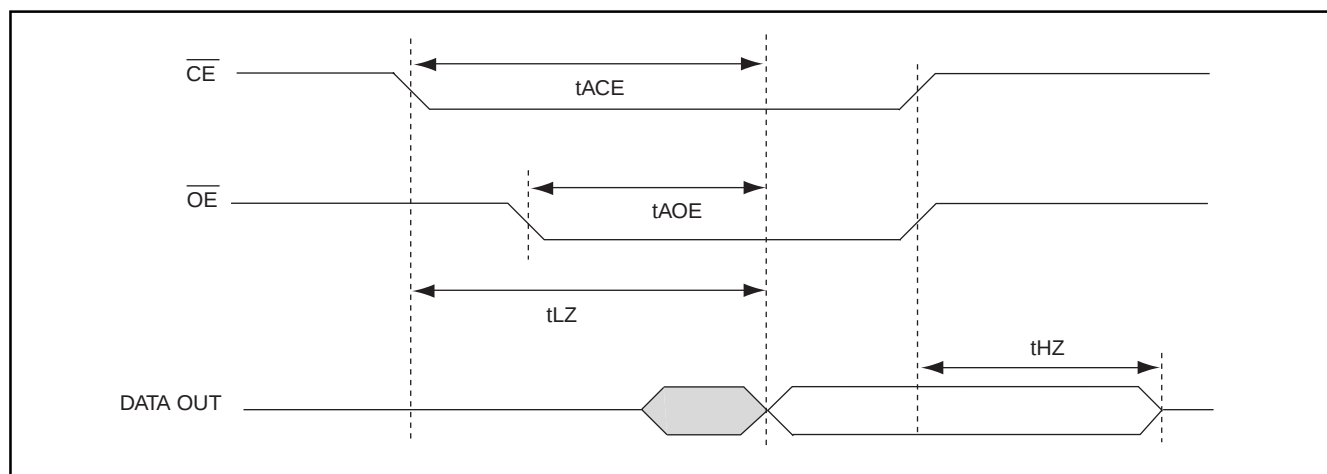
Input Pulse Levels	0.4V~ 2.4V
Input Rise and Fall Times	10ns
Input Timing Level	1.5V
Output Timing Level	0.8V and 2.0V
Output Load	1TLL+100pF

TIMING DIAGRAM

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



PROPAGATION DELAY FROM CHIP ENABLE (ADDRESS VALID)



ORDER INFORMATION

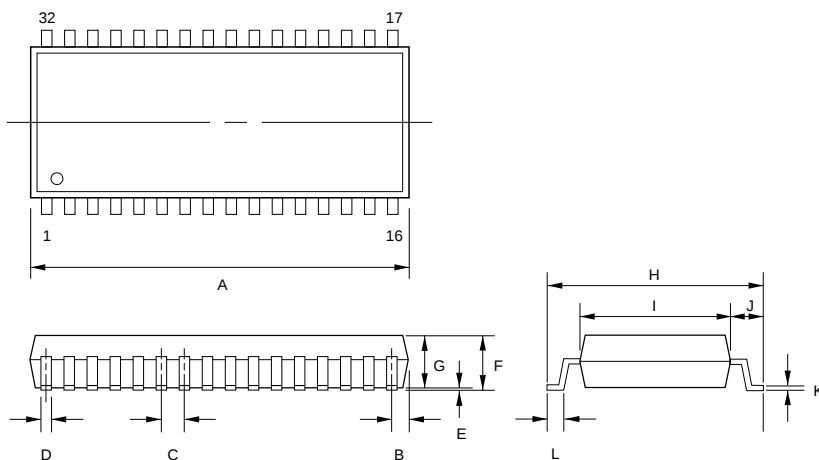
Part No.	Access Time	Operating Current MAX.	Standby Current MAX.	Package
MX23L4000MI-15	150ns	20mA	5uA	32 Pin SOP
MX23L4000MI-20	200ns	20mA	5uA	32 pin SOP
MX23L4000TI-15	150ns	20mA	5uA	32 pin TSOP
MX23L4000TI-20	200ns	20mA	5uA	32 pin TSOP

PACKAGE INFORMATION

32-PIN PLASTIC SOP (450 mil)

ITEM	MILLIMETERS	INCHES
A	20.95 max.	.825 max.
B	1.00 [REF]	.039 [REF]
C	1.27 [TP]	.050 [TP]
D	.40 [Typ.]	.016 [Typ.]
E	.05 min.	.002 min.
F	3.05 max.	.120 max.
G	2.69±.13	.106±.005
H	14.12±.25	.556±.010
I	11.30±.13	.445±.005
J	1.42	.056
K	.20 [Typ.]	.008 [Typ.]
L	.79	.031

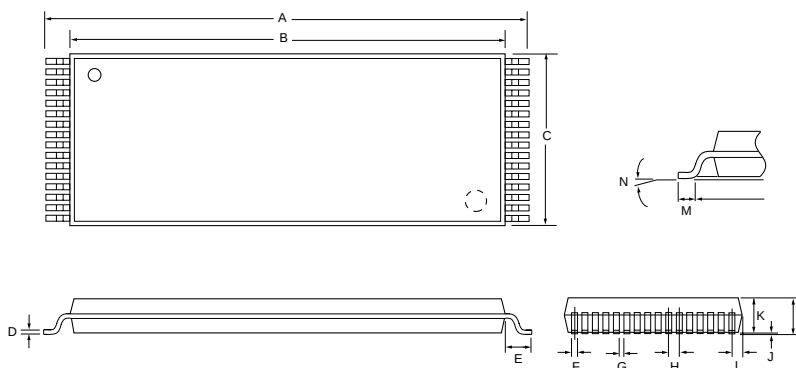
NOTE: Each lead centerline is located within .25 mm [.01 inch] of its true position [TP] at maximum material condition.



32-PIN PLASTIC TSOP

ITEM	MILLIMETERS	INCHES
A	20.0±.20	.078±.006
B	18.40±.10	.724±.004
C	8.20 max.	.323 max.
D	.15 [Typ.]	.006 [Typ.]
E	.80 [Typ.]	.031 [Typ.]
F	.20±.10	.008±.004
G	.30±.10	.012±.004
H	.50 [Typ.]	.020 [Typ.]
I	.45 max.	.018 max.
J	0 ~ .20	0 ~ .008
K	1.00±.10	.039±.004
L	1.27 max.	.050 max.
M	.50	.020
N	0 ~ 5°	.500

NOTE: Each lead centerline is located within .25 mm [.01 inch] of its true position [TP] at maximum material condition.





REVISION HISTORY

REVISION	DESCRIPTION	PAGE	DATE
1.4	AC CHARACTERISTICS tOH 25ns-->0ns	P3	FEB/01/1999



MX23L4000

MACRONIX INTERNATIONAL CO., LTD.

HEADQUARTERS:

TEL: +886-3-578-8888

FAX: +886-3-578-8887

EUROPE OFFICE:

TEL: +32-2-456-8020

FAX: +32-2-456-8021

JAPAN OFFICE:

TEL: +81-44-246-9100

FAX: +81-44-246-9105

SINGAPORE OFFICE:

TEL: +65-747-2309

FAX: +65-748-4090

TAIPEI OFFICE:

TEL: +886-3-509-3300

FAX: +886-3-509-2200

MACRONIX AMERICA, INC.

TEL: +1-408-453-8088

FAX: +1-408-453-8488

CHICAGO OFFICE:

TEL: +1-847-963-1900

FAX: +1-847-963-1909

[http : //www.macronix.com](http://www.macronix.com)