



# MX23C1610

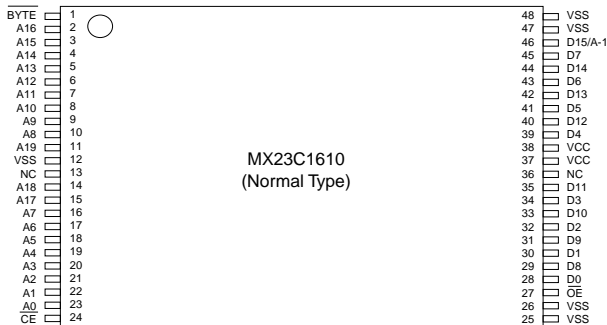
## 16M-BIT MASK ROM (8/16 BIT OUTPUT)

### FEATURES

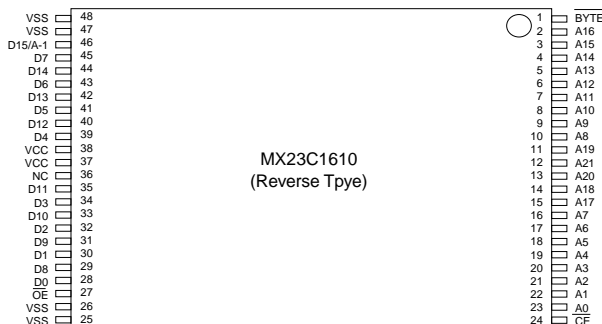
- Bit organization
  - 2M x 8 (byte mode)
  - 1M x 16 (word mode)
- Fast access time
  - Random access: 90ns (max.)
- Current
  - Operating: 60mA
  - Standby: 50uA
- Supply voltage
  - 5V±10%
- Package
  - 44 pin SOP (500mil)
  - 48 pin TSOP (20mm x 12mm)

### PIN CONFIGURATION

#### 48 TSOP (Normal Type)



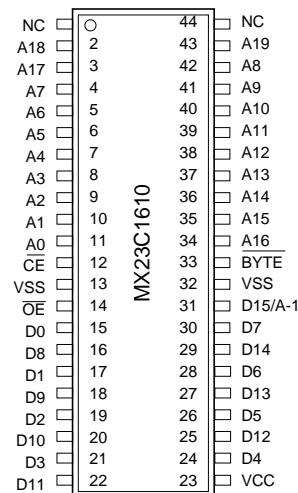
#### 48 TSOP (Reverse Type)



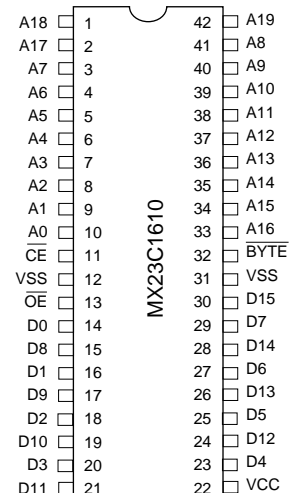
### ORDER INFORMATION

Part No.	Access	Package
MX23C1610MC-90	90ns	44 pin SOP
MX23C1610MC-10	100ns	44 pin SOP
MX23C1610MC-12	120ns	44 pin SOP
MX23C1610MC-15	150ns	44 pin SOP
MX23C1610TC-90	90ns	42 pin TSOP
MX23C1610TC-10	100ns	42 pin TSOP
MX23C1610TC-12	120ns	42 pin TSOP
MX23C1610TC-15	150ns	42 pin TSOP
MX23C1610RC-90	90ns	48 pin TSOP (Reverse type)
MX23C1610RC-10	100ns	48 pin TSOP (Reverse type)
MX23C1610RC-12	120ns	48 pin TSOP (Reverse type)
MX23C1610RC-15	150ns	48 pin TSOP (Reverse type)
MX23C1610PC-90	90ns	42 pin DIP
MX23C1610PC-10	100ns	42 pin DIP
MX23C1610PC-12	120ns	42 pin DIP

#### 44 SOP



#### 42 PDIP



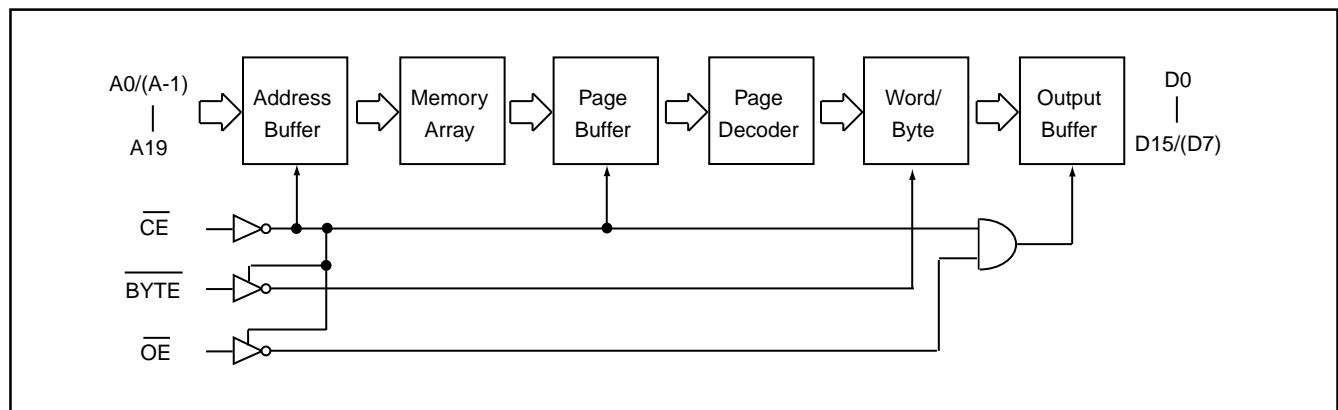
## PIN DESCRIPTION

Symbol	Pin Function
A0~A19	Address Inputs
D0~D14	Data Outputs
D15/A-1	D15 (Word Mode)/ LSB Address (Byte Mode)
$\overline{CE}$	Chip Enable Input
$\overline{OE}$	Output Enable Input
Byte	Word/ Byte Mode Selection
VCC	Power Supply Pin
VSS	Ground Pin
NC	No Connection

## MODE SELECTION

$\overline{CE}$	$\overline{OE}$	Byte	D15/A-1	D0~D7	D8~D15	Mode	Power
H	X	X	X	High Z	High Z	-	Stand-by
L	H	X	X	High Z	High Z	-	Active
L	L	H	Output	D0~D7	D8~D15	Word	Active
L	L	L	Input	D0~D7	High Z	Byte	Active

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings
Voltage on any Pin Relative to VSS	VIN	-0.5V to 7.0V
Ambient Operating Temperature	Topr	0°C to 70°C
Storage Temperature	Tstg	-65°C to 125°C

Note: Minimum DC voltage on input or I/O pins is -0.5V. During voltage transitions, inputs may undershoot VSS to -1.3V for periods of up to 20ns. Maximum DC voltage on input or I/O pins is VCC+0.5V. During voltage transitions, input may overshoot VCC to VCC+2.0V for periods of up to 20ns.

## DC CHARACTERISTICS (Ta = 0°C ~ 70°C, VCC = 5V±10%)

Item	Symbol	MIN.	MAX.	Conditions
Output High Voltage	VOH	2.4V	-	IOH = -1.0mA
Output Low Voltage	VOL	-	0.4V	IOL = 2.1mA
Input High Voltage	VIH	2.2V	VCC+0.3V	
Input Low Voltage	VIL	-0.3V	0.8V	
Input Leakage Current	ILI	-	10uA	0V, VCC
Output Leakage Current	ILO	-	10uA	0V, VCC
Operating Current	ICC1	-	60mA	tRC = 90ns, all output open
Standby Current (TTL)	ISTB1	-	1mA	$\overline{CE} = V_{IH}$
Standby Current (CMOS)	ISTB2	-	50uA	$\overline{CE} > V_{CC} - 0.2V$
Input Capacitance	CIN	-	10pF	Ta = 25°C, f = 1MHZ
Output Capacitance	COUT	-	10pF	Ta = 25°C, f = 1MHZ

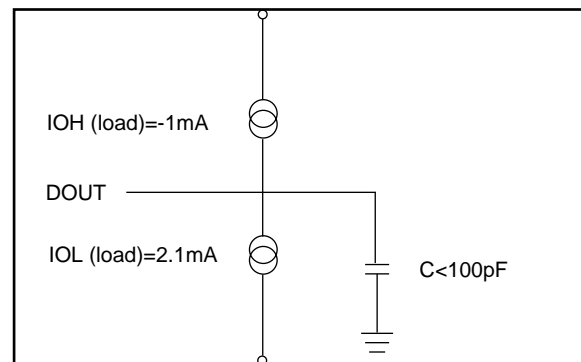
## AC CHARACTERISTICS (Ta = 0°C ~ 70°C, VCC = 5V±10%)

Item	Symbol	23C1610-90		23C1610-10		23C1610-12		23C1610-15	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Read Cycle Time	tRC	90ns	-	100ns	-	120ns	-	150ns	-
Address Access Time	tAA	-	90ns	-	100ns	-	120ns	-	150ns
Chip Enable Access Time	tACE	-	90ns	-	100ns	-	120ns	-	150ns
Output Enable Time	tOE	-	45ns	-	50ns	-	60ns	-	70ns
Output Hold After Address	tOH	0ns	-	0ns	-	0ns	-	0ns	-
Output High Z Delay	tHZ	-	20ns	-	20ns	-	20ns	-	20ns

Note: Output high-impedance delay (tHZ) is measured from  $\overline{OE}$  or  $\overline{CE}$  going high, and this parameter guaranteed by design over the full voltage and temperature operating range - not tested.

### 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	See Figure



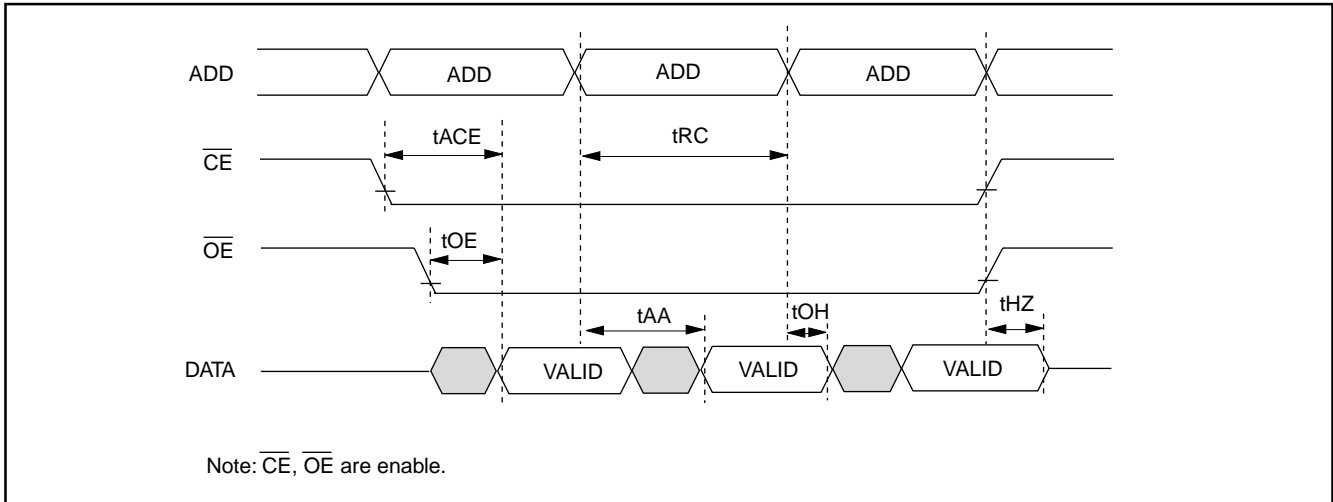
Note: No output loading is present in tester load board.

Active loading is used and under software programming control.

Output loading capacitance includes load board's and all stray capacitance.

## TIMING DIAGRAM

### RANDOM READ

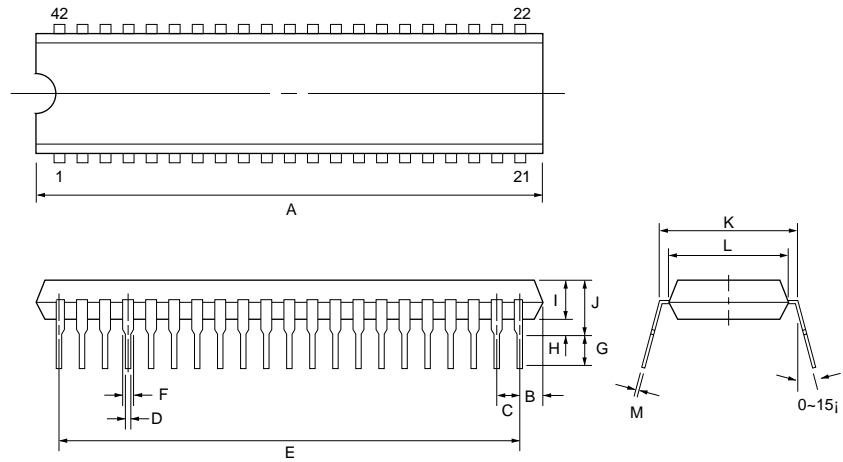


## PACKAGE INFORMATION

### 42-PIN PLASTIC DIP(600 mil)

ITEM	MILLIMETERS	INCHES
A	52.54 max.	2.070 max.
B	0.76 [REF]	.030 [REF]
C	2.54 [TP]	.100 [TP]
D	.46 [Typ.]	.018 [Typ.]
E	50.76	2.000
F	1.27 [Typ.]	.050 [Typ.]
G	3.30 ± .25	.130 ± .010
H	.51 [REF]	.020 [REF]
I	3.94 ± .25	.155 ± .010
J	5.33 max.	.210 max.
K	15.22 ± .25	.600 ± .010
L	13.97 ± .25	.550 ± .010
M	.25 [Typ.]	.010 [Typ.]

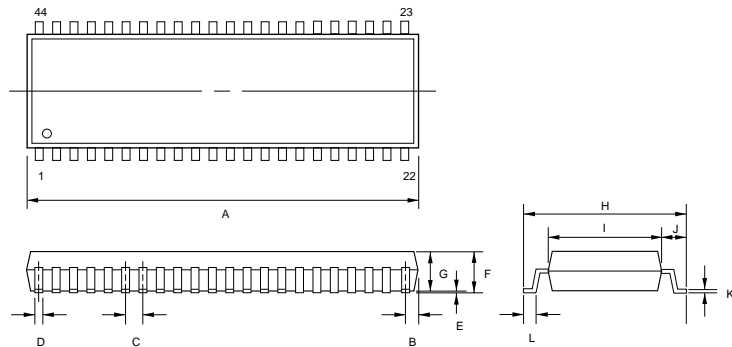
**NOTE:** Each lead centerline is located within .25 mm [.01 inch] of its true position [TP] at maximum material condition.



### 44-PIN PLASTIC SOP

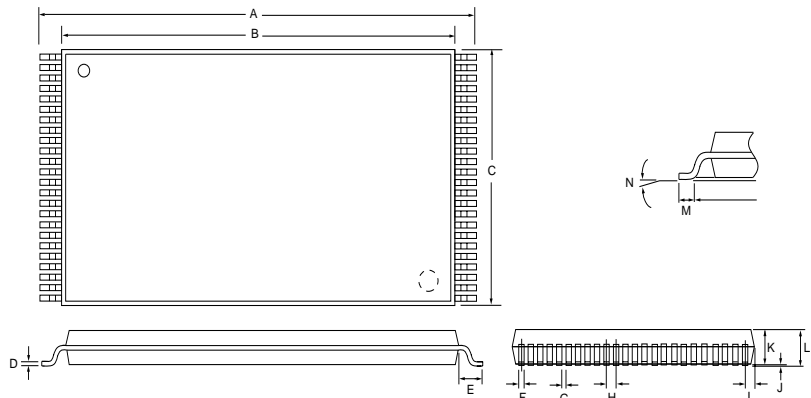
ITEM	MILLIMETERS	INCHES
A	28.70 max.	1.130 max.
B	1.10 [REF]	.043 [REF]
C	1.27 [TP]	.050 [TP]
D	.40 ± .10 [Typ.]	.016 ± .004 [Typ.]
E	.010 min.	.004 min.
F	3.00 max.	.118 max.
G	2.80 ± .13	.110 ± .005
H	16.04 ± .30	.631 ± .012
I	12.60	.496
J	1.72	.068
K	.15 ± .10 [Typ.]	.006 ± .004 [Typ.]
L	.80 ± .20	.031 ± .008

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



## 48-PIN PLASTIC TSOP

ITEM	MILLIMETERS	INCHES
A	20.0 ± .20	.787 ± .008
B	18.40 ± .10	.724 ± .004
C	12.20 max.	.480 max.
D	0.15 [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
2.9	DC Characteristics: The standby current (CMOS) ISTB2 is changed as 50 uA instead of 100uA. AC Characteristics: Add 90ns grade item, deleted 200ns grade item. The output enable time (tOE) is changed as 60ns instead of 70ns in 120ns grade item, and 70ns instead of 80ns in 150ns grade item. The output high Z delay is changed as 20ns instead of 70ns.		SEP/17/1997
3.0	AC Characteristics: tOH 10ns --> 0ns	P3	FEB/01/1999



**MX23C1610**

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**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)**