

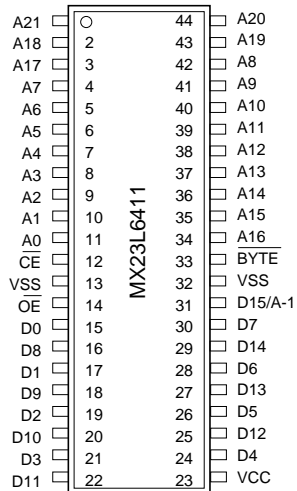
## 64M-BIT (8M x 8 / 4M x 16) Mask ROM with Page Mode

### FEATURES

- Bit organization
  - 8M x 8 (byte mode)
  - 4M x 16 (word mode)
- Fast access time
  - Random access: 100ns (max.)
  - Page access: 30ns (max.)
- Page Size
  - 8 words per page
- Current
  - Operating: 50mA
  - Standby: 15uA (max.)
- Supply voltage
  - 2.7V~3.6V
- Package
  - 44 pin SOP (500 mil)
  - 48 pin TSOP (12mm x 20mm)

### PIN CONFIGURATION

#### 44 SOP



### ORDER INFORMATION

| Part No.       | Access Time | Page Access Time | Package                       |
|----------------|-------------|------------------|-------------------------------|
| MX23L6411MC-12 | 120ns       | 50ns             | 44 pin SOP                    |
| MX23L6411TC-12 | 120ns       | 50ns             | 48 pin TSOP                   |
| MX23L6411RC-12 | 120ns       | 50ns             | 48 pin TSOP<br>(Reverse type) |
| MX23L6411MC-10 | 100ns       | 30ns             | 44 pin SOP                    |
| MX23L6411TC-10 | 100ns       | 30ns             | 48 pin TSOP                   |
| MX23L6411RC-10 | 100ns       | 30ns             | 48 pin TSOP<br>(Reverse type) |

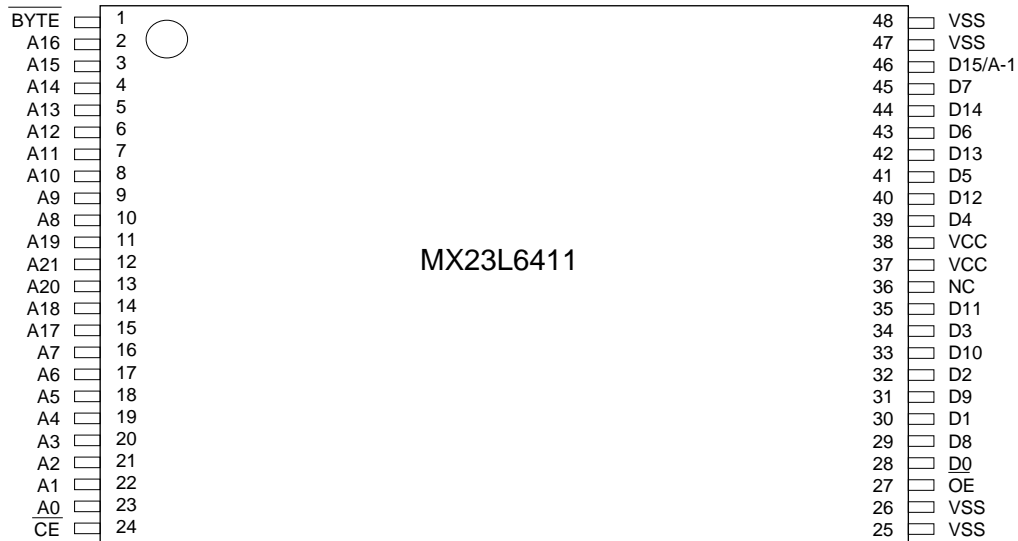
### PIN DESCRIPTION

| Symbol  | Pin Function                              |
|---------|---|
| A0~A21  | Address Inputs                            |
| D0~D14  | Data Outputs                              |
| D15/A-1 | D15 (Word Mode) / LSB Address (Byte Mode) |
| CE      | Chip Enable Input                         |
| OE      | Output Enable Input                       |
| Byte    | Word / Byte Mode Selection                |
| VCC     | Power Supply Pin                          |
| VSS     | Ground Pin                                |
| NC      | No Connection                             |

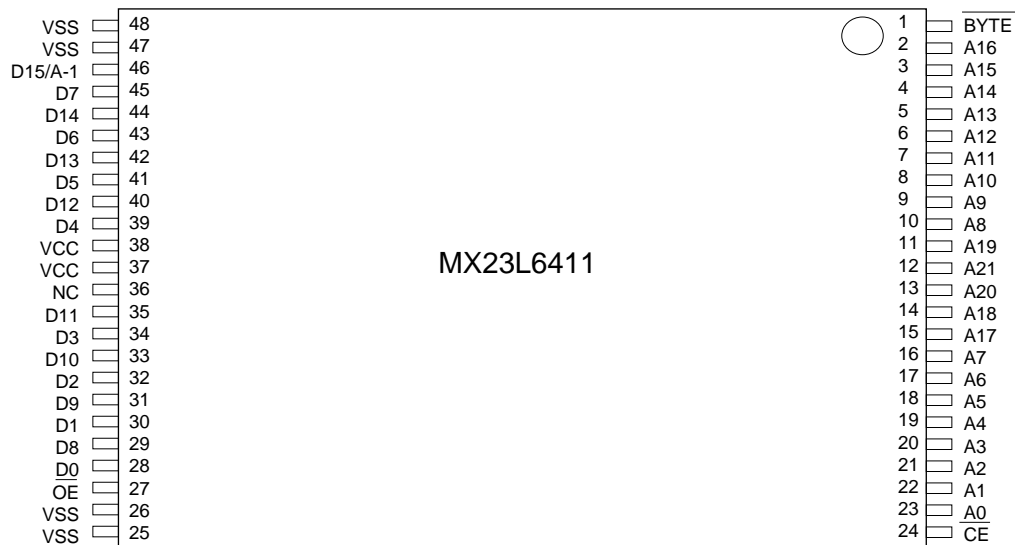
### MODE SELECTION

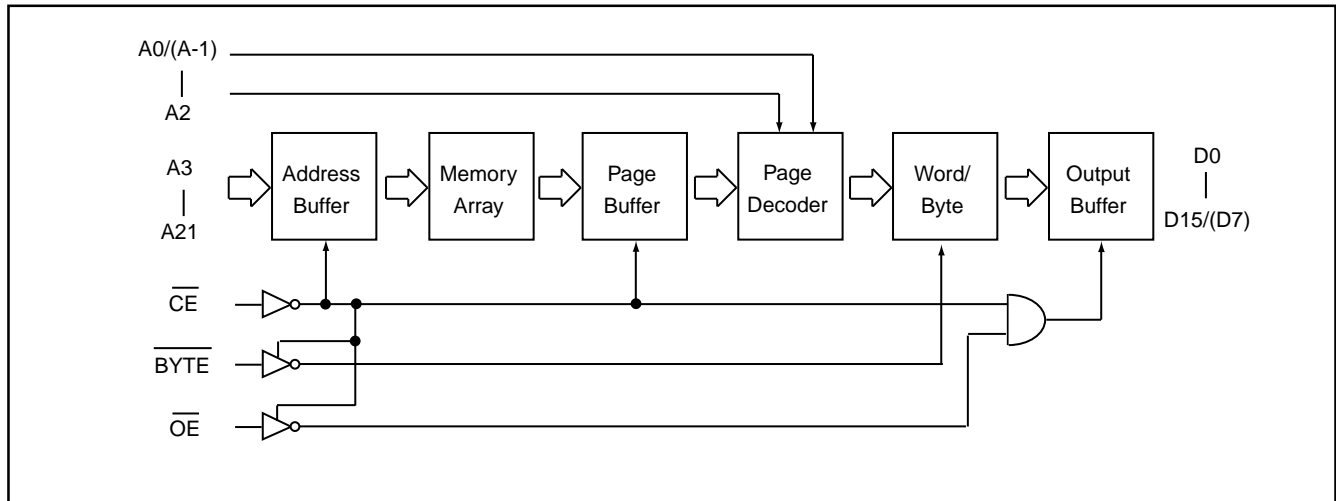
| CE | OE | Byte | D15/A-1 | D0~D7  | D8~D15 | Mode | Power    |
|----|----|------|---------|--------|--------|------|----------|
| H  | X  | X    | X       | High Z | High Z | -    | Stand-by |
| L  | H  | X    | X       | High Z | High Z | -    | Active   |
| L  | L  | H    | Output  | D0~D7  | D8~D15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

## 48 TSOP (NORMAL TYPE)



## 48 TSOP (REVERSE TYPE)



**BLOCK DIAGRAM**

**ABSOLUTE MAXIMUM RATINGS**

| Item                               | Symbol           | Ratings           |
|------------------------------------|------------------|-------------------|
| Supply Voltage Relative to VSS     | VCC              | -0.3V to 4.3V     |
| Voltage on any Pin Relative to VSS | VIN              | -0.5V to VCC + 2V |
| Ambient Operating Temperature      | T <sub>opr</sub> | 0° C to 70° C     |
| Storage Temperature                | T <sub>stg</sub> | -65° C to 125° C  |

**DC CHARACTERISTICS** ( $T_a = 0^\circ\text{C} \sim 70^\circ\text{C}$ ,  $V_{CC} = 2.7\text{V} \sim 3.6\text{V}$ )

| Item                   | Symbol | MIN.  | MAX.     | Conditions                             |
|------------------------|--------|-------|----------|--|
| Output High Voltage    | VOH    | 2.4V  | -        | IOH = -0.4mA                           |
| Output Low Voltage     | VOL    | -     | 0.4V     | IOL = 1.6mA                            |
| Input High Voltage     | VIH    | 2.2V  | VCC+0.3V |  |
| Input Low Voltage      | VIL    | -0.3V | 0.8V     |  |
| Input Leakage Current  | ILI    | -     | 5uA      | 0V, VCC                                |
| Output Leakage Current | ILO    | -     | 5uA      | 0V, VCC                                |
| Operating Current      | ICC1   | -     | 50mA     | f=5MHz, all output open                |
| Standby Current (TTL)  | ISTB1  | -     | 1mA      | $\overline{CE} = V_{IH}$               |
| Standby Current (CMOS) | ISTB2  | -     | 15uA     | $\overline{CE} > V_{CC} - 0.2\text{V}$ |
| Input Capacitance      | CIN    | -     | 10pF     | $T_a = 25^\circ\text{C}$ , f = 1MHZ    |
| Output Capacitance     | COUT   | -     | 10pF     | $T_a = 25^\circ\text{C}$ , f = 1MHZ    |

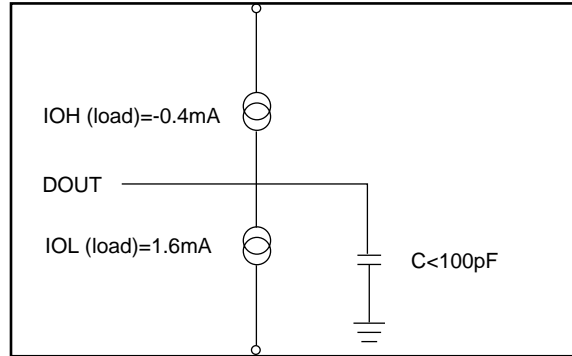
**AC CHARACTERISTICS** ( $T_a = 0^\circ\text{C} \sim 70^\circ\text{C}$ ,  $V_{CC} = 2.7\text{V} \sim 3.6\text{V}$ )

| Item                      | Symbol | <u>23L6411-10</u> |       | <u>23L6411-12</u> |       |
|---------------------------|--------|-------------------|-------|-------------------|-------|
|                           |        | MIN.              | MAX.  | MIN.              | MAX.  |
| Read Cycle Time           | tRC    | 100ns             | -     | 120ns             | -     |
| Address Access Time       | tAA    | -                 | 100ns | -                 | 120ns |
| Chip Enable Access Time   | tACE   | -                 | 100ns | -                 | 120ns |
| Page Mode Access Time     | tPA    | -                 | 30ns  | -                 | 50ns  |
| Output Enable Time        | tOE    | -                 | 30ns  | -                 | 50ns  |
| Output Hold After Address | tOH    | 0ns               | -     | 0ns               | -     |
| Output High Z Delay       | tHZ    | -                 | 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

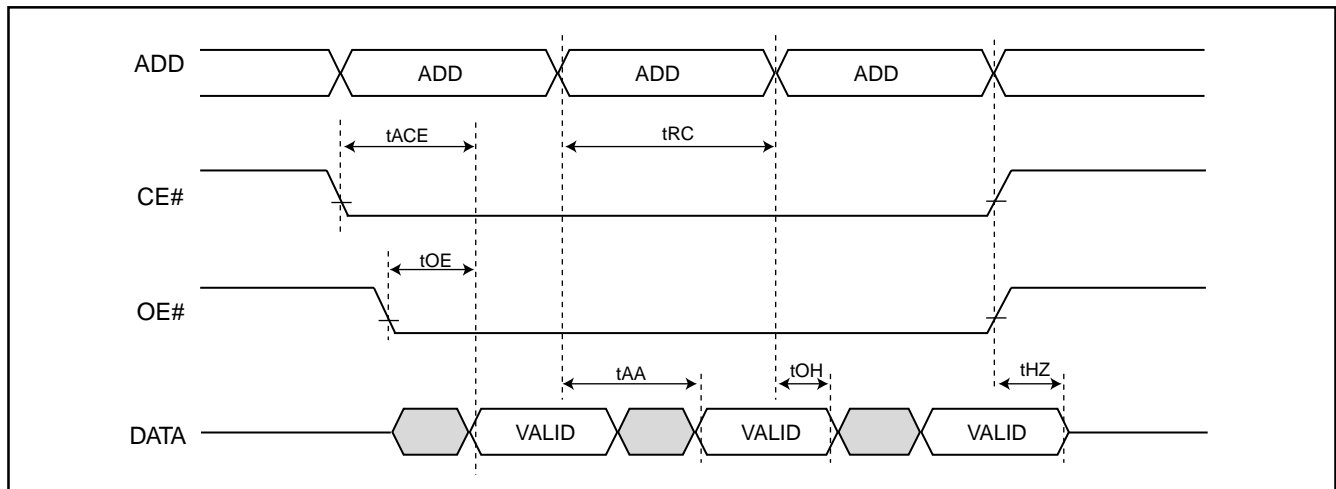
|                           |            |
|---------------------------|------------|
| Input Pulse Levels        | 0.4V~ 2.4V |
| Input Rise and Fall Times | 10ns       |
| Input Timing Level        | 1.4V       |
| Output Timing Level       | 1.4V       |
| Output Load               | See Figure |



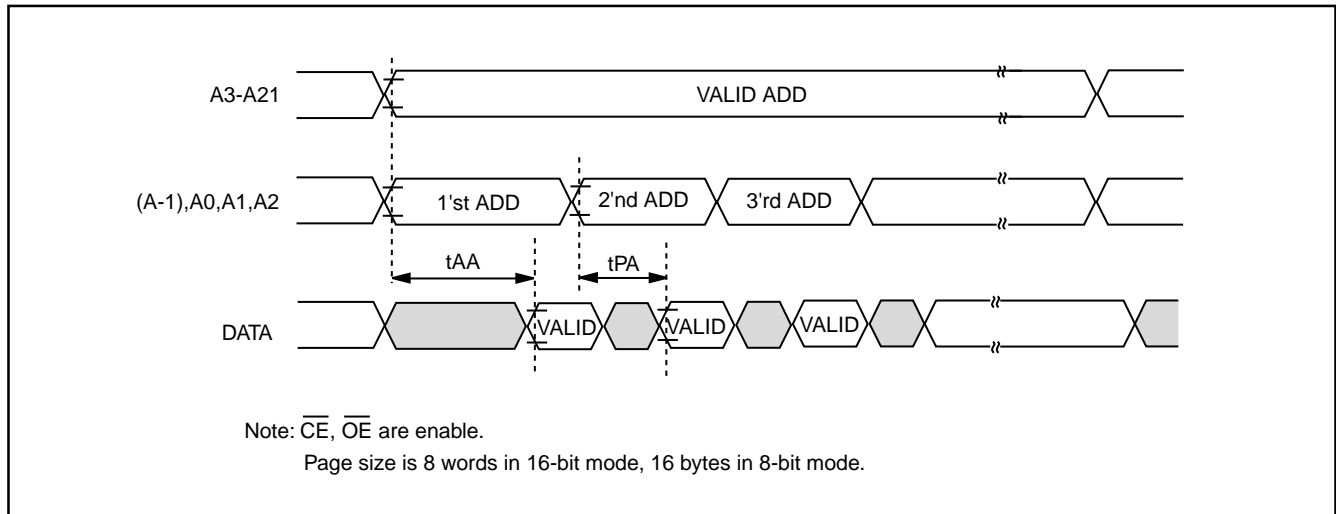
Note: No output loading is present in tester load board.  
 Active loading is used and under software programming control.  
 Output loading capacitance includes load board's and all stray capacitance.

## TIMING DIAGRAM

### RANDOM READ

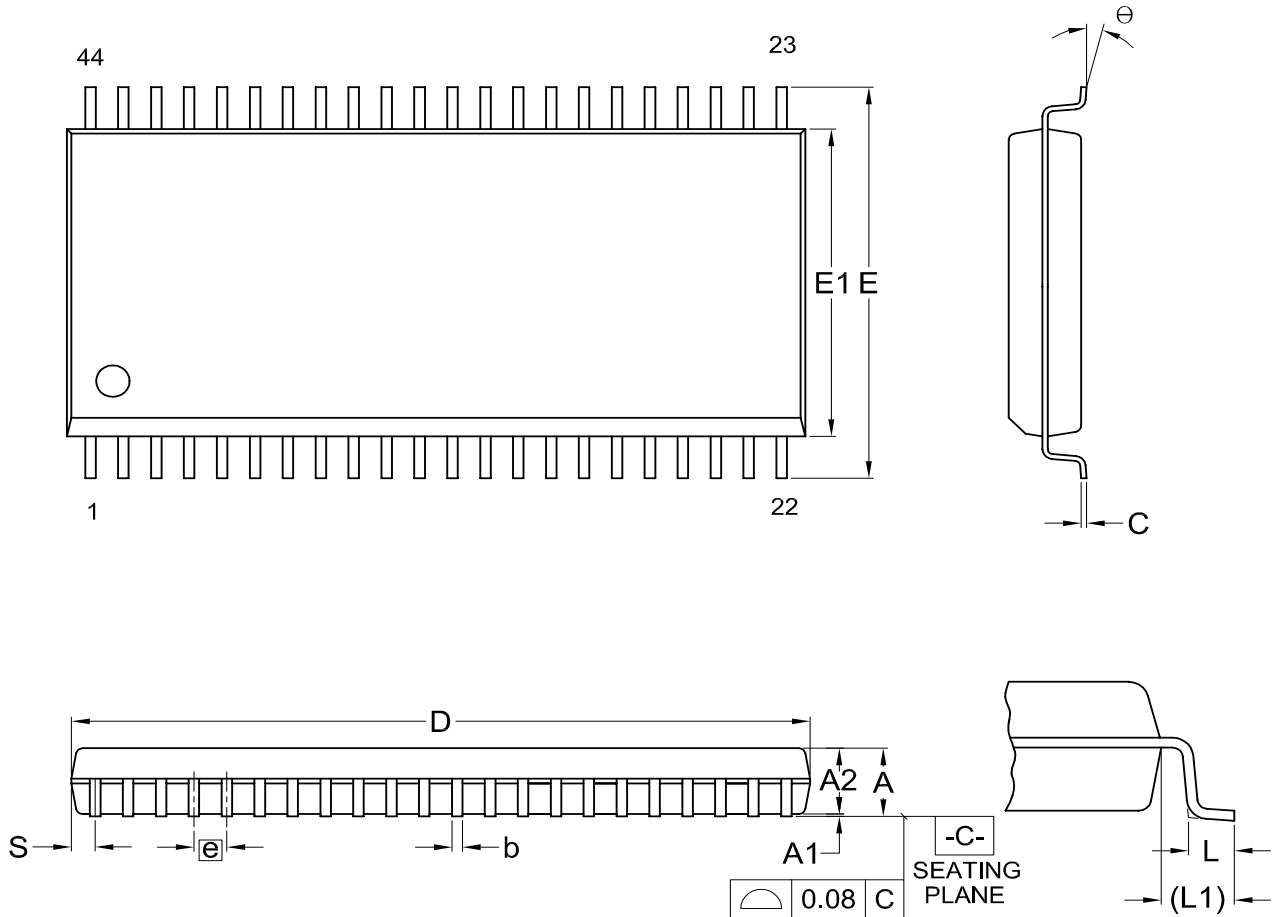


### PAGE READ



## PACKAGE INFORMATION

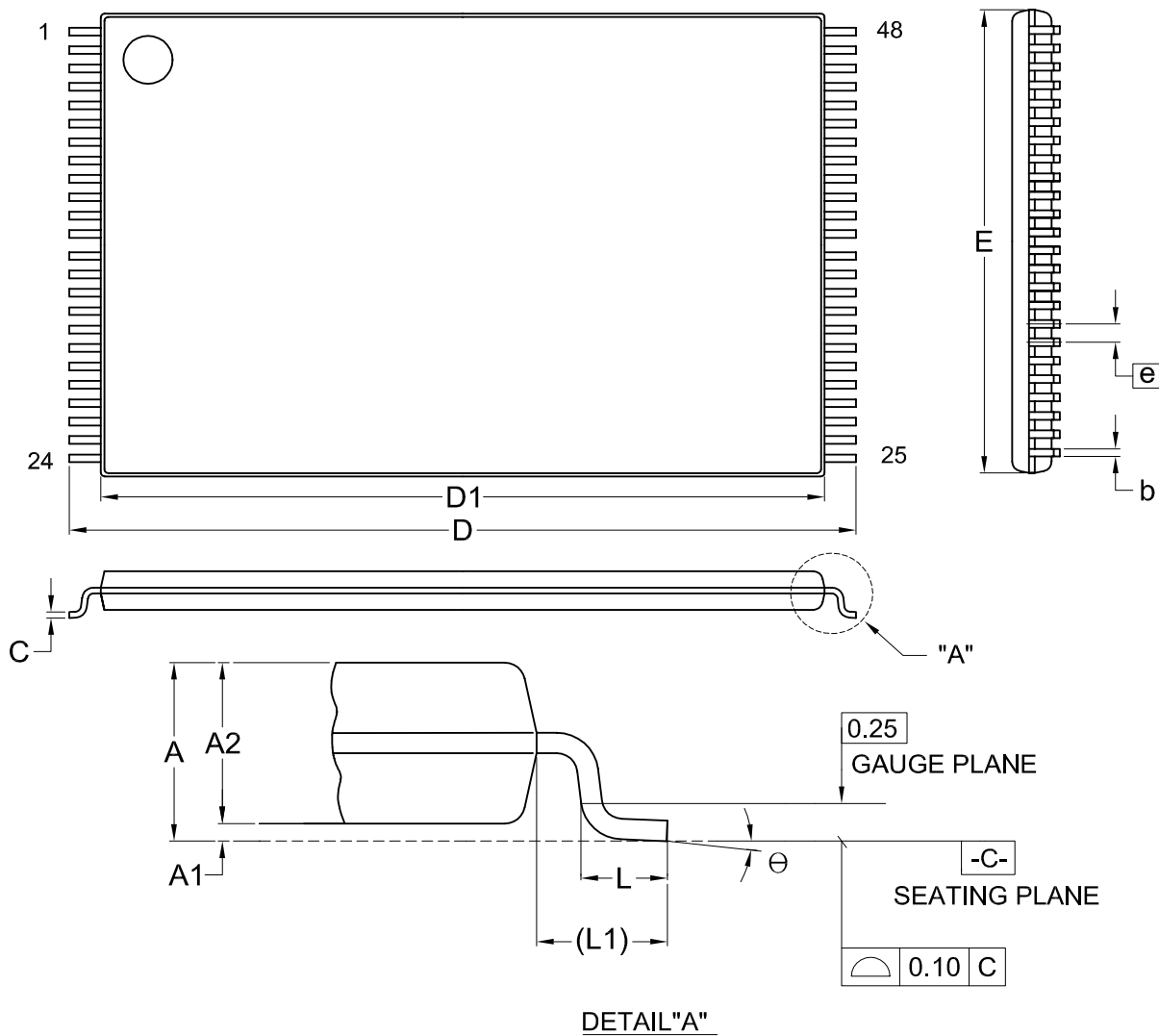
Title: Package Outline for SOP 44L (500MIL)



Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL |      | A     | A1    | A2    | b     | C     | D     | E     | E1    | e     | L     | L1    | S     | θ  |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| UNIT   |      |       |       |       |       |       |       |       |       |       |       |       |       |    |
| mm     | Min. | ---   | 0.10  | 2.59  | 0.36  | 0.15  | 28.37 | 15.83 | 12.47 |       | 0.56  | 1.51  | 0.78  | 0  |
|        | Nom. | ---   | 0.15  | 2.69  | 0.41  | 0.20  | 28.50 | 16.03 | 12.60 | 1.27  | 0.76  | 1.71  | 0.91  | 5  |
|        | Max. | 3.00  | 0.20  | 2.80  | 0.51  | 0.25  | 28.63 | 16.23 | 12.73 |       | 0.96  | 1.91  | 1.04  | 10 |
| Inch   | Min. | ---   | 0.004 | 0.102 | 0.014 | 0.006 | 1.117 | 0.623 | 0.491 |       | 0.022 | 0.059 | 0.031 | 0  |
|        | Nom. | ---   | 0.006 | 0.106 | 0.016 | 0.008 | 1.122 | 0.631 | 0.496 | 0.050 | 0.030 | 0.067 | 0.036 | 5  |
|        | Max. | 0.118 | 0.008 | 0.110 | 0.020 | 0.010 | 1.127 | 0.639 | 0.501 |       | 0.038 | 0.075 | 0.041 | 10 |

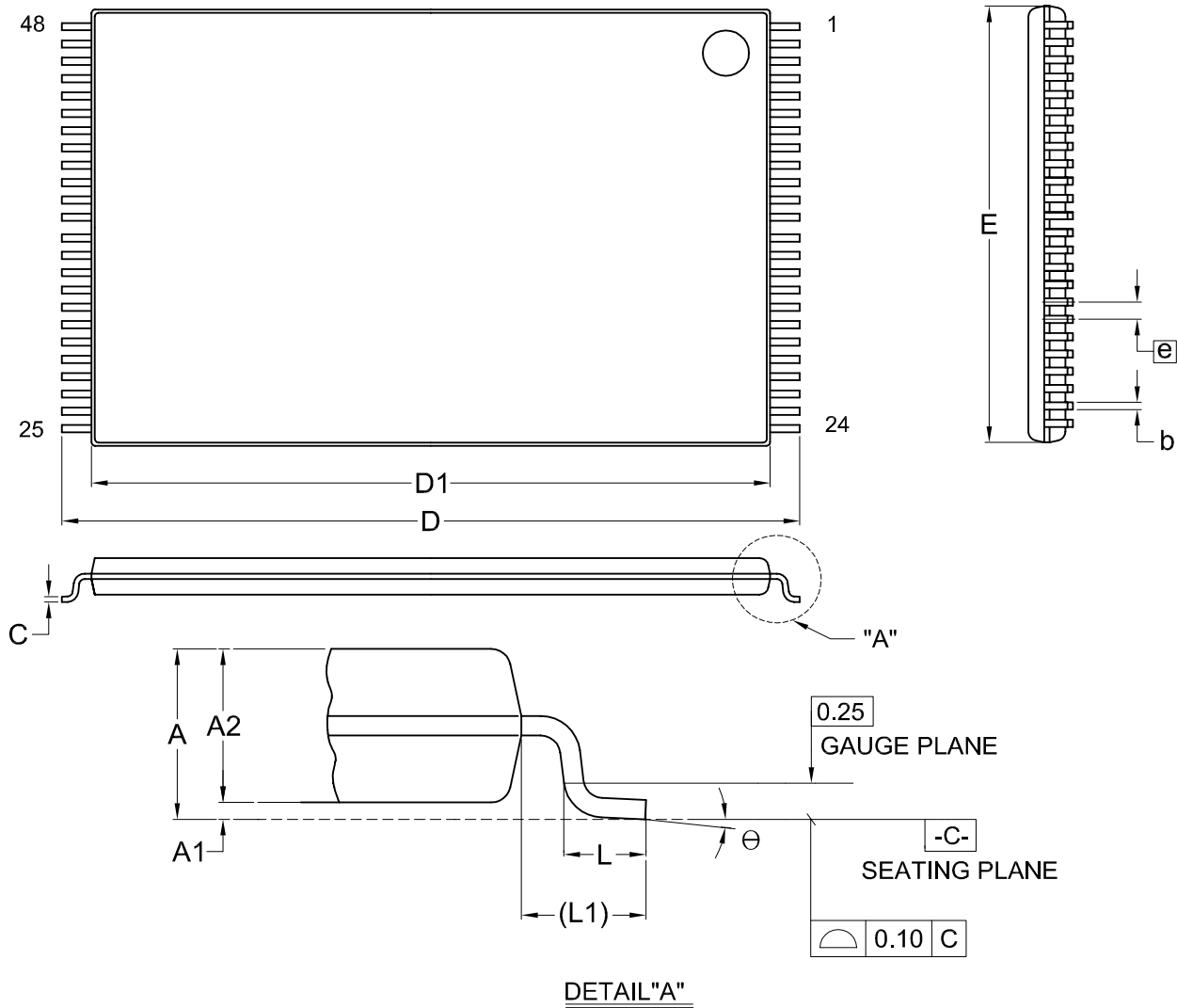
| DWG.NO.   | REVISION | REFERENCE |      |  | ISSUE DATE |
|-----------|----------|-----------|------|--|------------|
|           |          | JEDEC     | EIAJ |  |            |
| 6110-1405 | 6        | MO-175    |      |  | 11-26-'03  |

**Title: Package Outline for TSOP(I) 48L (12X20mm)NORMAL FORM**


Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL |    | A    | A1    | A2    | b     | C     | D     | D1    | E     | e     | L     | L1    | $\theta$ |   |
|--------|----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|---|
| UNIT   | mm | Min. | ---   | 0.05  | 0.95  | 0.17  | 0.10  | 19.80 | 18.30 | 11.90 |       | 0.50  | 0.70     | 0 |
|        |    | Nom. | ---   | 0.10  | 1.00  | 0.20  | 0.13  | 20.00 | 18.40 | 12.00 | 0.50  | 0.60  | 0.80     | 5 |
|        |    | Max. | 1.20  | 0.15  | 1.05  | 0.27  | 0.21  | 20.20 | 18.50 | 12.10 |       | 0.70  | 0.90     | 8 |
| Inch   | mm | Min. | ---   | 0.002 | 0.037 | 0.007 | 0.004 | 0.780 | 0.720 | 0.469 |       | 0.020 | 0.028    | 0 |
|        |    | Nom. | ---   | 0.004 | 0.039 | 0.008 | 0.005 | 0.787 | 0.724 | 0.472 | 0.020 | 0.024 | 0.031    | 5 |
|        |    | Max. | 0.047 | 0.006 | 0.041 | 0.011 | 0.008 | 0.795 | 0.728 | 0.476 |       | 0.028 | 0.035    | 8 |

| DWG.NO.   | REVISION | REFERENCE |      |  | ISSUE DATE |
|-----------|----------|-----------|------|--|------------|
|           |          | JEDEC     | EIAJ |  |            |
| 6110-1607 | 7        | MO-142    |      |  | 12-01-'03  |

**Title: Package Outline for TSOP(I) 48L (12X20mm)REVERSE FORM**

DETAIL "A"

Dimensions (inch dimensions are derived from the original mm dimensions)

| SYMBOL |      | A     | A1    | A2    | b     | C     | D     | D1    | E     | e     | L     | L1    | Θ |
|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| UNIT   |      |       |       |       |       |       |       |       |       |       |       |       |   |
| mm     | Min. | ---   | 0.05  | 0.95  | 0.17  | 0.10  | 19.80 | 18.30 | 11.90 |       | 0.50  | 0.70  | 0 |
|        | Nom. | ---   | 0.10  | 1.00  | 0.20  | 0.13  | 20.00 | 18.40 | 12.00 | 0.50  | 0.60  | 0.80  | 5 |
|        | Max. | 1.20  | 0.15  | 1.05  | 0.27  | 0.21  | 20.20 | 18.50 | 12.10 |       | 0.70  | 0.90  | 8 |
| Inch   | Min. | ---   | 0.002 | 0.037 | 0.007 | 0.004 | 0.780 | 0.720 | 0.469 |       | 0.020 | 0.028 | 0 |
|        | Nom. | ---   | 0.004 | 0.039 | 0.008 | 0.005 | 0.787 | 0.724 | 0.472 | 0.020 | 0.024 | 0.031 | 5 |
|        | Max. | 0.047 | 0.006 | 0.041 | 0.011 | 0.008 | 0.795 | 0.728 | 0.476 |       | 0.028 | 0.035 | 8 |

| DWG.NO.     | REVISION | REFERENCE |      |  | ISSUE DATE |
|-------------|----------|-----------|------|--|------------|
|             |          | JEDEC     | EIAJ |  |            |
| 6110-1607.1 | 7        | MO-142    |      |  | 12-01-'03  |



**REVISION HISTORY**

| <b>REVISION</b> | <b>DESCRIPTION</b>   | <b>PAGE</b> | <b>DATE</b> |
|-----------------|--|-------------|-------------|
| 2.1             | AC CHARACTERISTICS tOH 10ns-->0ns  | P4          | JAN/29/1999 |
| 2.2             | DC CHARACTERISTICS ISTB2 5uA-->15uA  | P4          | SEP/03/1999 |
| 2.3             | DC Characteristics voltage range VCC=2.9V~3.6V-->3.0V~3.6V   | P3          | DEC/24/1999 |
| 2.4             | Add 100ns speed grade  | P1,4        | JUL/02/2000 |
| 2.5             | Modify Operating Current:60mA-->50mA   | P1,4        | DEC/29/2000 |
| 2.6             | Modify Package Information   | P6,7        | JUL/17/2001 |
| 2.7             | Change VCC from 3.0~3.6V to 2.7~3.3V   | P1,3        | AUG/03/2001 |
| 2.8             | 1. Add supply voltage relative to VSS<br>2. Change voltage on any pin relative to VSS:-0.5V to VCC+2.0 | P3<br>P3    | JUL/19/2002 |
| 2.9             | 1. Change supply voltage from 2.7V~3.3V to 2.7V~3.6V   | P1,4        | SEP/02/2002 |
| 3.0             | Modify Package Information   | P6~8        | NOV/22/2002 |



**MX23L6411**

---

---

**MACRONIX INTERNATIONAL Co., LTD.**

**Headquarters:**

TEL:+886-3-578-6688

FAX:+886-3-563-2888

**Europe Office :**

TEL:+32-2-456-8020

FAX:+32-2-456-8021

**Hong Kong Office :**

TEL:+86-755-834-335-79

FAX:+86-755-834-380-78

**Japan Office :**

**Kawasaki Office :**

TEL:+81-44-246-9100

FAX:+81-44-246-9105

**Osaka Office :**

TEL:+81-6-4807-5460

FAX:+81-6-4807-5461

**Singapore Office :**

TEL:+65-6346-5505

FAX:+65-6348-8096

**Taipei Office :**

TEL:+886-2-2509-3300

FAX:+886-2-2509-2200

**MACRONIX AMERICA, INC.**

TEL:+1-408-262-8887

FAX:+1-408-262-8810

*<http://www.macronix.com>*

---

MACRONIX INTERNATIONAL CO., LTD. reserves the right to change product and specifications without notice.