



# A23L26166/A23L261661/A23L261662 Series

**4M X 16 / 8M X 8 BIT CMOS MASK ROM WITH PAGE MODE**

***Preliminary***

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## **Document Title**

**4M X 16 / 8M X 8 BIT CMOS MASK ROM WITH PAGE MODE**

## **Revision History**

| <b><u>Rev. No.</u></b> | <b><u>History</u></b>  | <b><u>Issue Date</u></b> | <b><u>Remark</u></b> |
|------------------------|--|--------------------------|----------------------|
| 0.0                    | Initial issue  | August 18, 2005          | Preliminary          |
| 0.1                    | Change part no. from A23L2617/A23L26171 to A23L26166/A23L261661  | May 30, 2006             |                      |
| 0.2                    | Remove 44-pin SOP and 48-pin TSOP (reverse type) packages<br>Change access time from 80ns(max.)/2.7V~3.6V to 90ns(max.)/2.7/3.6V | September 12, 2008       |                      |
| 0.3                    | Add 56-pin TSOP(1) package type  | October 8, 2008          |                      |
| 0.4                    | Remove -70 grade   | December 17, 2009        |                      |



# A23L26166/A23L261661/A23L261662 Series

**Preliminary**

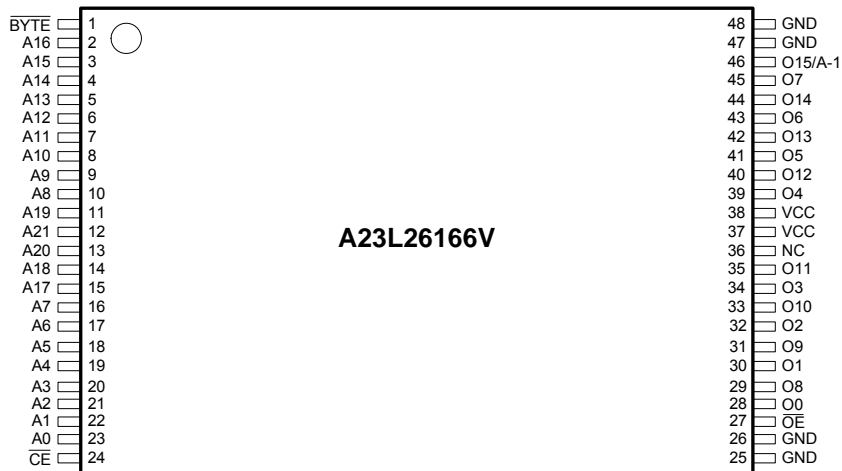
**4M X 16 / 8M X 8 BIT CMOS MASK ROM**

## Features

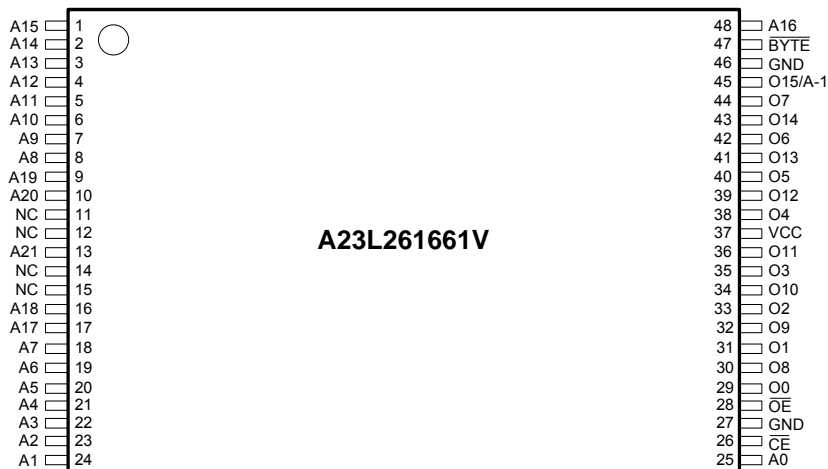
- 4M x 16 bit or 8M x 8 bit organization
- Supply voltage range: 2.7V~3.6V
- Random access time: 90ns (max.)/2.7V~3.6V
- Current: Operating: 30mA  
Standby: 30  $\mu$ A
- Page Size:
  - 8 words per page
  - Page access: 30ns (max.)/2.7V~3.6V
- Three-state outputs for wired-OR expansion
- Full static operation
- All inputs and outputs are directly TTL-compatible
- Available in 48-pin TSOP (Mask ROM type and flash memory's pinouts compatible) and 56-pin TSOP (I) packages
- All Pb-free (Lead-free) products are RoHS compliant
- Pinout compatible with flash type (A23L261661)

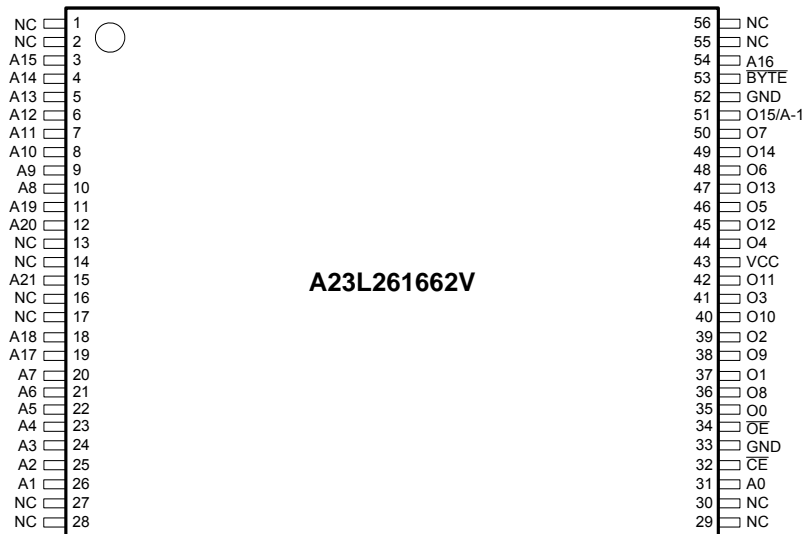
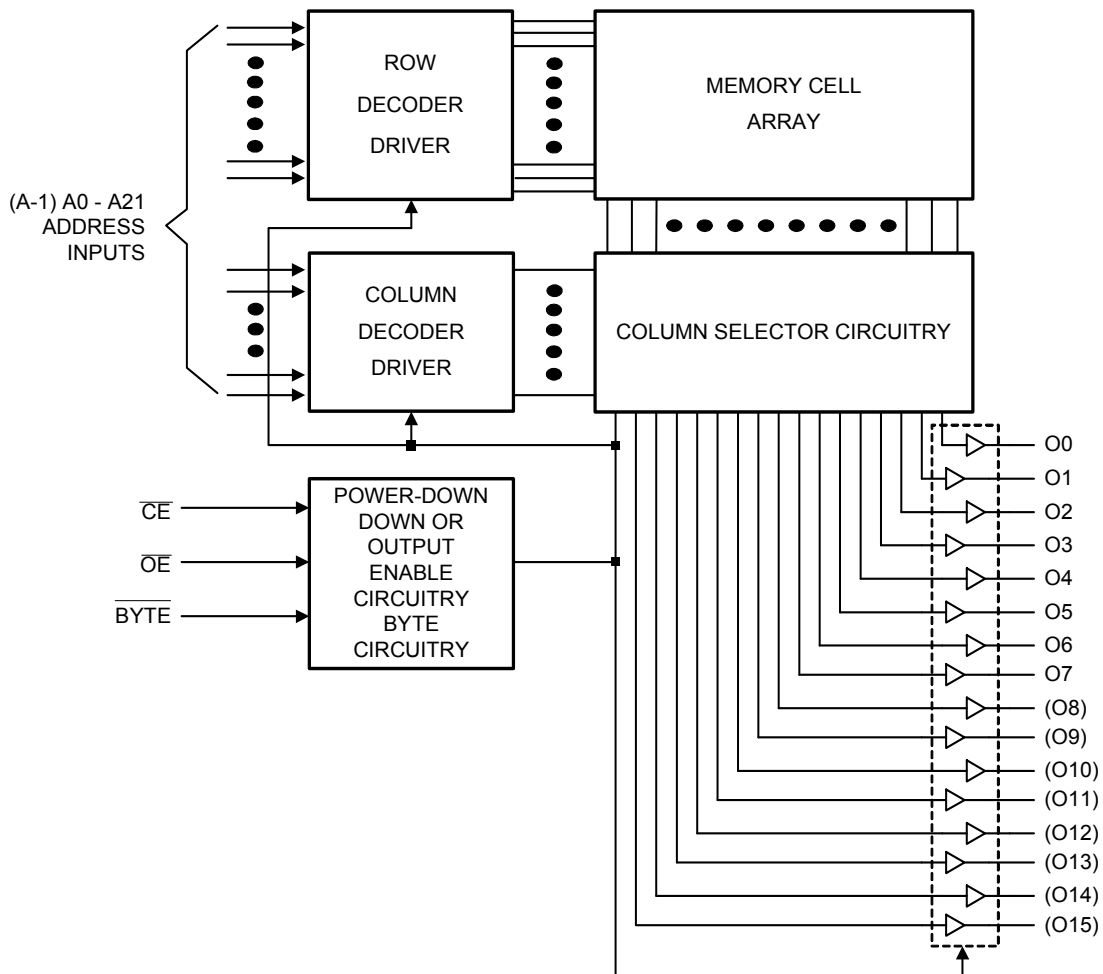
## Pin Configurations

### ■ TSOP (Mask ROM type)



### ■ TSOP (Flash type)



**Pin Configurations (continued)**
**■ 56-pin TSOP(I)**

**Block Diagram**


**Pin Descriptions**

| Pin No.                                    |  |   | Symbol            | Description                                       |
|--|--|---|-------------------|---|
| 48L TSOP<br>(Mask ROM Type)<br>(A23L26166) | 48L TSOP<br>(Flash Type)<br>(A23L261661) | 56L TSOP (I)<br>(A23L261662)              |                   |   |
| 2-23                                       | 1-10, 13, 16-25, 48                      | 3-12, 15, 18-26,<br>31, 54                | A0-A21            | Address Inputs                                    |
| 28-35, 39-45                               | 29-36, 38-44                             | 35-42, 44-50                              | O0-O14            | Data Outputs                                      |
| 46   | 45                                       | 51  | O15/A-1           | Output 15(WORD mode) /<br>LSB Address (BYTE mode) |
| 24   | 26                                       | 32  | $\overline{CE}$   | Chip Enable Input                                 |
| 27   | 28                                       | 34  | $\overline{OE}$   | Output Enable Input                               |
| 1  | 47                                       | 53  | $\overline{BYTE}$ | BYTE or WORD mode Selection                       |
| 37-38                                      | 37                                       | 43  | VCC               | Power Supply                                      |
| 25-26, 47-48                               | 27, 46                                   | 33, 52                                    | GND               | Ground  |
| -  | 11, 12, 14, 15                           | 1-2, 13-14, 16-17,<br>27-28, 29-30, 55-56 | NC                | No Connection                                     |

**Recommended DC Operating Conditions**

 (T<sub>A</sub> = 0°C to + 70°C)

| Symbol          | Parameter          | Min.  | Max.    | Unit |
|-----------------|--------------------|-------|---------|------|
| VCC             | Supply Voltage     | 2.7   | 3.6     | V    |
| GND             | Ground             | 0     | 0       | V    |
| V <sub>IH</sub> | Input High Voltage | 2.2   | VCC+0.3 | V    |
| V <sub>IL</sub> | Input Low Voltage  | - 0.3 | 0.6     | V    |

**Absolute Maximum Ratings\***

Ambient Operating Temperature . . . . . 0°C to + 70°C  
 Storage Temperature . . . . . -65°C to + 125°C  
 Output Voltage . . . . . -0.5V to VCC + 0.5V  
 Input Voltage . . . . . -0.5V to VCC + 0.5V

**\*Comments**

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to this 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 or intended. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

**DC Electrical Characteristics**

(T<sub>A</sub> = 0°C to + 70°C, VCC = 2.7V~3.6V, GND = 0V)

| Symbol           | Parameter                     | Min. | Max.      | Unit | Conditions                                  | Note |
|------------------|-------------------------------|------|-----------|------|---|------|
| V <sub>OH</sub>  | Output High Voltage           | 2.4  |           | V    | I <sub>OH</sub> = -0.4mA (3V)               |      |
| V <sub>OL</sub>  | Output Low Voltage            |      | 0.4       | V    | I <sub>OL</sub> = 1.6mA (3V)                |      |
| V <sub>IH</sub>  | Input High Voltage            | 2.2  | VCC + 0.3 | V    |   |      |
| V <sub>IL</sub>  | Input Low Voltage             | -0.3 | 0.6       | V    |   |      |
| I <sub>LI</sub>  | Input Leakage Current         |      | +10       | μA   | VCC = max.<br>V <sub>IN</sub> = VCC to GND  |      |
| I <sub>LO</sub>  | Output Leakage Current        |      | +10       | μA   | VCC = max.<br>V <sub>OUT</sub> = VCC to GND | 1    |
| I <sub>CC</sub>  | Operating Supply Current      |      | 50        | mA   | t <sub>CYC</sub> = min.                     | 2    |
| I <sub>SB</sub>  | Standby Supply Current (TTL)  |      | 1.5       | mA   | $\overline{CE} = V_{IH}$                    |      |
| I <sub>SB1</sub> | Standby Supply Current (CMOS) |      | 30        | μA   | $\overline{CE} \geq VCC - 0.2V$             |      |

**Capacitance**

| Symbol         | Parameter          | Min. | Max. | Unit | Test Conditions                     | Note |
|----------------|--------------------|------|------|------|-------------------------------------|------|
| C <sub>i</sub> | Input Capacitance  |      | 10   | pF   | T <sub>A</sub> = 25°C<br>f = 1.0MHz | 3    |
| C <sub>o</sub> | Output Capacitance |      | 10   | pF   |                                     |      |

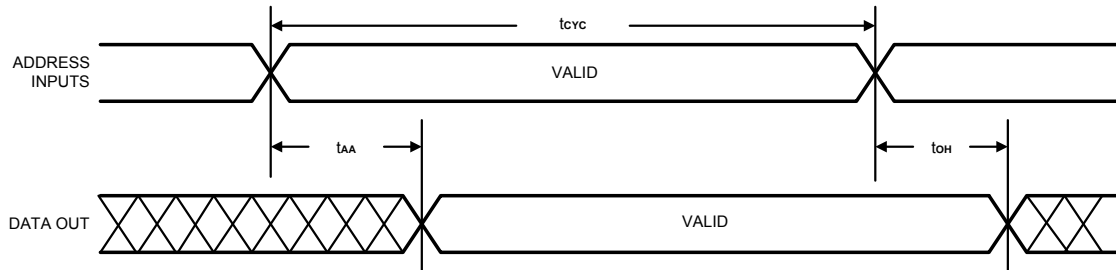
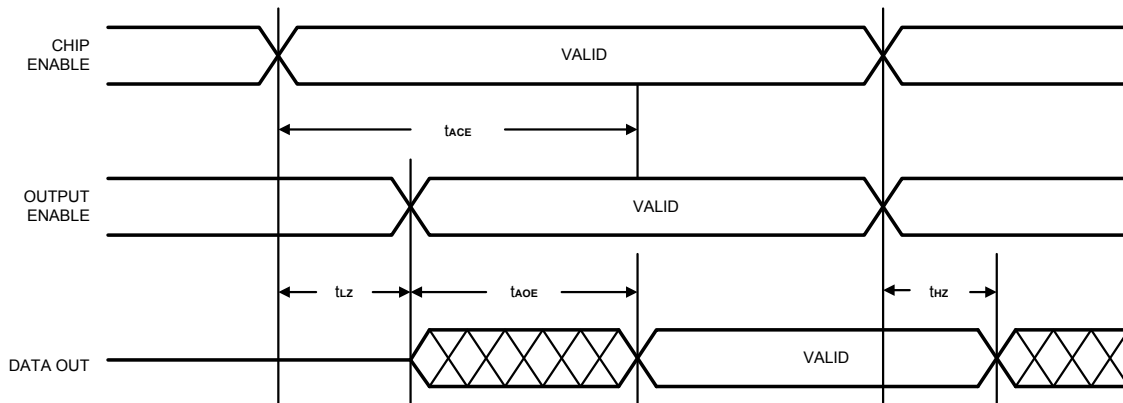
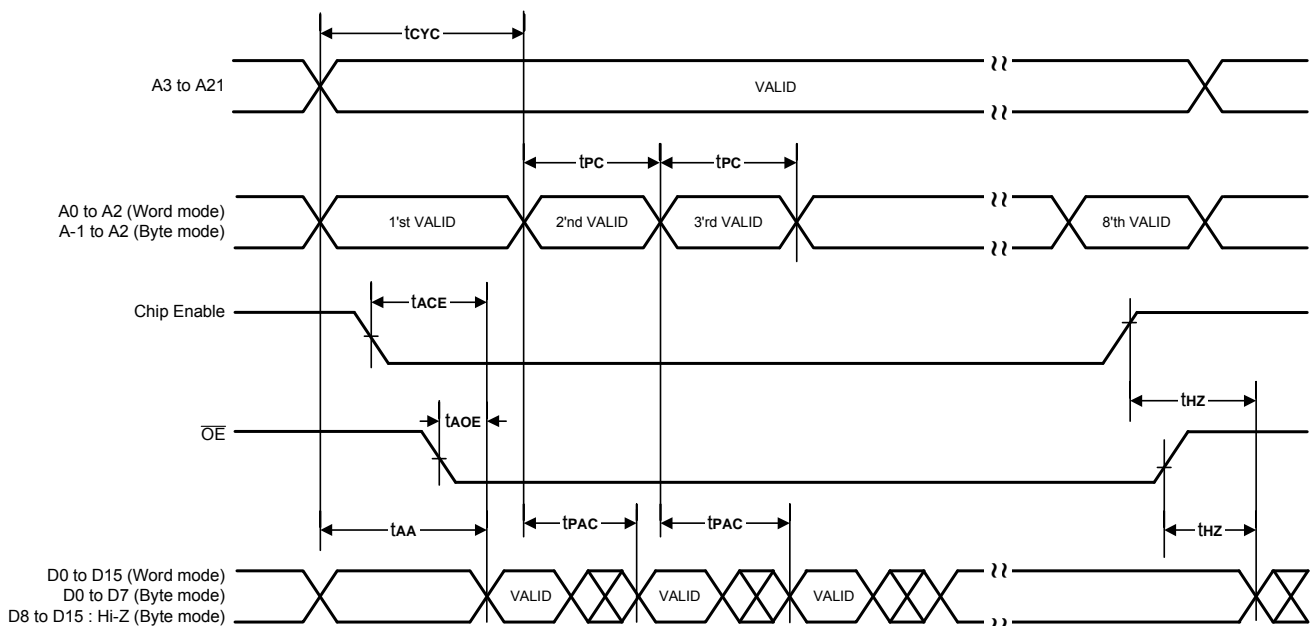
**AC Characteristics** (T<sub>A</sub> = 0°C to +70°C, VCC = 2.7V~3.6V)

| Symbol           | Parameter                        | A23L26166/A23L261661/ A23L261662-90 |      | Unit | Note |
|------------------|----------------------------------|-------------------------------------|------|------|------|
|                  |                                  | Min.                                | Max. |      |      |
| t <sub>cyC</sub> | Cycle Time                       | 90                                  |      | ns   |      |
| t <sub>AA</sub>  | Address Access Time              |                                     | 90   | ns   |      |
| t <sub>ACE</sub> | Chip Enable Access Time          |                                     | 90   | ns   |      |
| t <sub>PC</sub>  | Page Cycle Time                  | 30                                  |      | ns   |      |
| t <sub>PAC</sub> | Page Access Time                 |                                     | 30   | ns   |      |
| t <sub>AOE</sub> | Output Enable Access Time        |                                     | 30   | ns   |      |
| t <sub>OH</sub>  | Output Hold after Address Change | 10                                  |      | ns   |      |
| t <sub>LZ</sub>  | Output Low Z Delay               | 10                                  |      | ns   | 4, 6 |
| t <sub>HZ</sub>  | Output High Z Delay*             |                                     | 20   | ns   | 5, 6 |

\* t<sub>HZ</sub> is specified from either  $\overline{OE}$  or  $\overline{CE}$  going disabled, whichever occurs first.

**Notes:**

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

**Timing Waveforms**
**Propagation Delay from Address ( $\overline{CE}$  = Active,  $\overline{OE}$  = Active)**

**Propagation Delay from Chip Enable or Output Enable (Address Valid)**

**Page Access Mode Read Cycle**




**AC Test Conditions**

| Part No.                           | A23L26166/ A23L261661/ A23L261662-90            |
|------------------------------------|---|
| Applied Voltage                    | 2.7V~3.6V                                       |
| Input Pulse Levels                 | 0.4V to 2.4V                                    |
| Input Rise and Fall Time           | 10 ns   |
| Timing Measurement Reference Level | V <sub>IN</sub> = 1.4V, V <sub>OUT</sub> = 1.4V |
| Output Load                        | 1 TTL gate and C <sub>L</sub> = 100pF           |

**Function Table**

| $\overline{CE}$ | $\overline{OE/NC}$ | $\overline{BYTE}$ | O15/A-1         | O0 - O7  | O8 - O15 | Mode           |
|-----------------|--------------------|-------------------|-----------------|----------|----------|----------------|
| L               | L                  | H                 | Data Pin O15    | Data Out | Data out | Word           |
| L               | L                  | L                 | LSB Address A-1 | Data Out | Hi - Z   | Byte           |
| H               | X                  | X                 | X               | Hi - Z   | Hi - Z   | Power-down     |
| L               | H                  | X                 | X               | Hi - Z   | Hi - Z   | Output Disable |



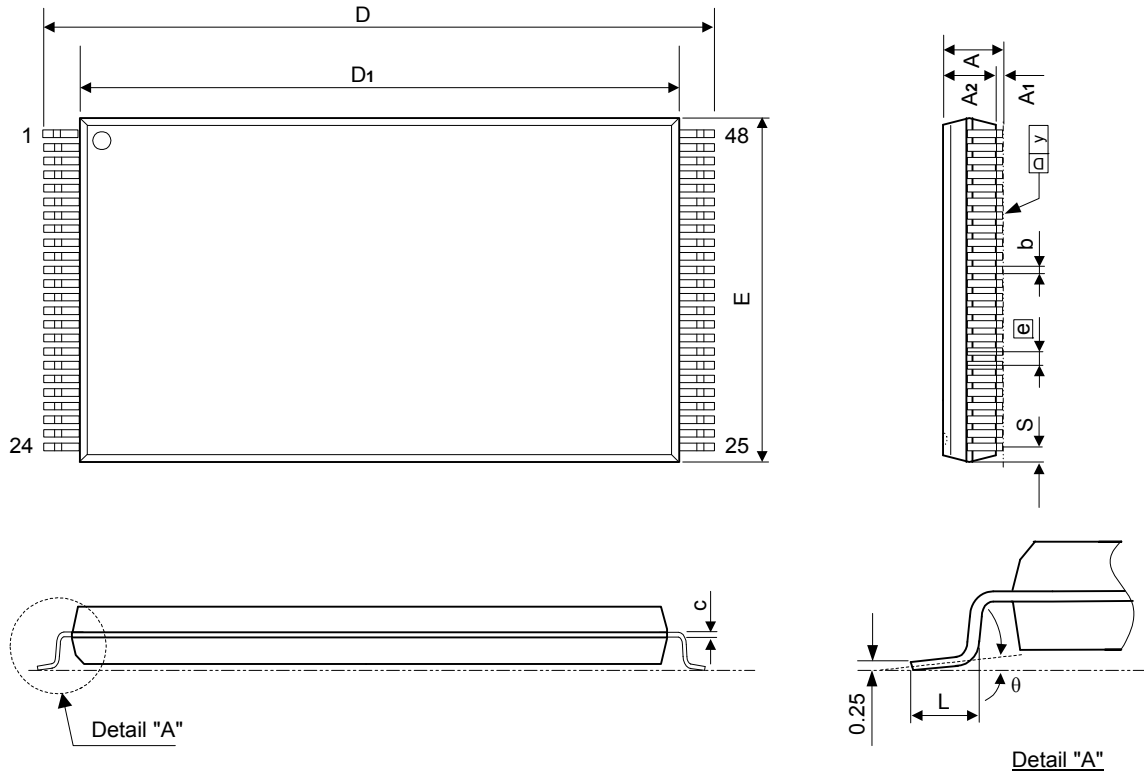


**Ordering Information**

| <b>Part No.</b> | <b>Access Time (ns)</b> | <b>Package</b>                      |
|-----------------|-------------------------|-------------------------------------|
| A23L26166V-90F  | 90                      | 48L Pb-Free TSOP (Mask ROM)         |
| A23L261661V-90F | 90                      | 48L Pb-Free TSOP (Flash Compatible) |
| A23L261662V-90F | 90                      | 56L Pb-Free TSOP (I)                |

**Package Information**
**TSOP 48L (Type I) Outline Dimensions**

unit: inches/mm



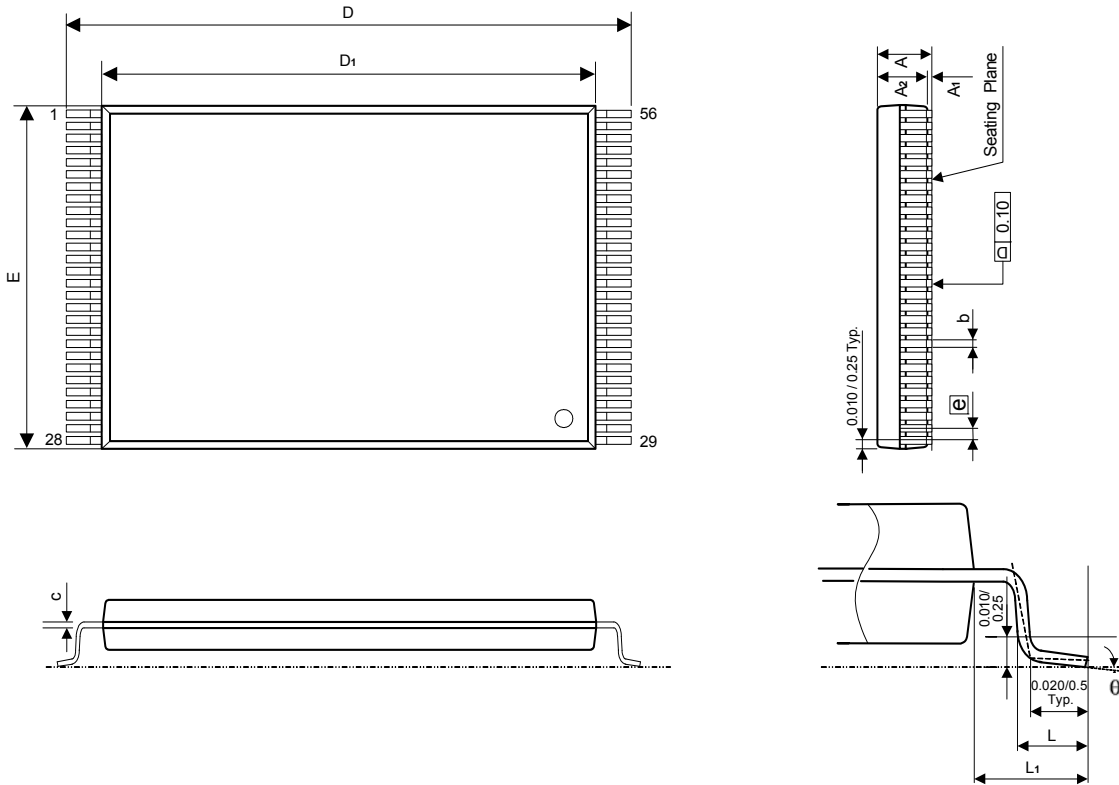
| Symbol         | Dimensions in inches |       |       | Dimensions in mm |       |       |
|----------------|----------------------|-------|-------|------------------|-------|-------|
|                | Min                  | Nom   | Max   | Min              | Nom   | Max   |
| A              | -                    | -     | 0.047 | -                | -     | 1.20  |
| A <sub>1</sub> | 0.002                | -     | 0.006 | 0.05             | -     | 0.15  |
| A <sub>2</sub> | 0.037                | 0.039 | 0.042 | 0.94             | 1.00  | 1.06  |
| b              | 0.007                | 0.009 | 0.011 | 0.18             | 0.22  | 0.27  |
| c              | 0.004                | -     | 0.008 | 0.12             | -     | 0.20  |
| D              | 0.779                | 0.787 | 0.795 | 19.80            | 20.00 | 20.20 |
| D <sub>1</sub> | 0.720                | 0.724 | 0.728 | 18.30            | 18.40 | 18.50 |
| E              | -                    | 0.472 | 0.476 | -                | 12.00 | 12.10 |
| $\square$ e    | 0.020 BASIC          |       |       | 0.50 BASIC       |       |       |
| L              | 0.016                | 0.020 | 0.024 | 0.40             | 0.50  | 0.60  |
| S              | 0.011 Typ.           |       |       | 0.28 Typ.        |       |       |
| y              | -                    | -     | 0.004 | -                | -     | 0.10  |
| θ              | 0°                   | -     | 8°    | 0°               | -     | 8°    |

**Notes:**

1. The maximum value of dimension D includes end flash.
2. Dimension E does not include resin fins.
3. Dimension S includes end flash.

**Package Information**
**TSOP 56L (Type I) Outline Dimensions**

unit: inches/mm



| Symbol         | Dimensions in inches |       |       | Dimensions in mm |       |       |
|----------------|----------------------|-------|-------|------------------|-------|-------|
|                | Min                  | Nom   | Max   | Min              | Nom   | Max   |
| A              | -                    | -     | 0.047 | -                | -     | 1.20  |
| A <sub>1</sub> | 0.002                | -     | 0.006 | 0.05             | -     | 0.15  |
| A <sub>2</sub> | 0.037                | 0.039 | 0.041 | 0.95             | 1.00  | 1.05  |
| b              | 0.007                | 0.009 | 0.011 | 0.17             | 0.22  | 0.27  |
| c              | 0.005                | 0.007 | 0.009 | 0.12             | 0.17  | 0.22  |
| D              | 0.780                | 0.787 | 0.795 | 19.80            | 20.00 | 20.20 |
| D <sub>1</sub> | 0.720                | 0.724 | 0.728 | 18.30            | 18.40 | 18.50 |
| E              | 0.547                | 0.551 | 0.555 | 13.90            | 14.00 | 14.10 |
| $\square$      | 0.020 BSC            |       |       | 0.50 BSC         |       |       |
| L              | 0.018                | 0.024 | 0.030 | 0.45             | 0.60  | 0.75  |
| L <sub>1</sub> | 0.024                | 0.031 | 0.039 | 0.60             | 0.80  | 1.00  |
| $\theta$       | 0°                   | -     | 8°    | 0°               | -     | 8°    |