Document Title

1M X 16 / 2M X 8 BIT CMOS MASK ROM

Revision History

Rev. No.	History	Issue Date	Remark
0.0	Initial issue	November 7, 2003	Preliminary
0.1	Change t_{AOE} from 35ns to 30ns(max.) at –70 grade	May 23, 2005	
0.2	Delete A23L0616/A23L06161/A23L06162-100 part Change t_{ACE} from 70ns to 75ns(max.)	June 20, 2005	

Preliminary

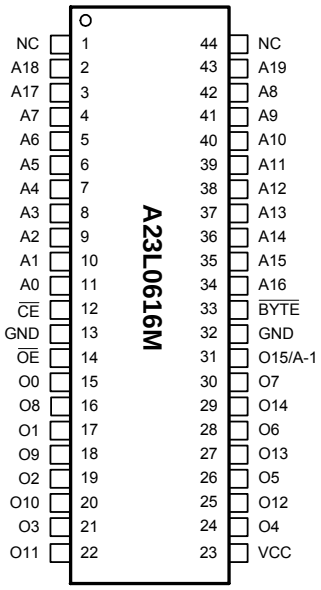
1M X 16 / 2M X 8 BIT CMOS MASK ROM

Features

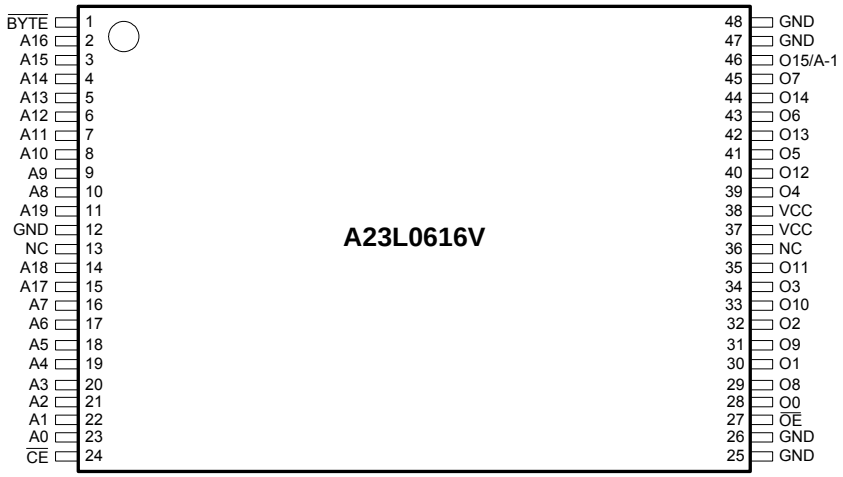
- 1M x 16 bit or 2M x 8 bit organization
- Supply voltage range: 2.7V~3.6V
- Access time: 70 ns (max.)/2.7V~3.6V
- Current: Operating: 40mA (typ.)/3.3V
  Standby: 10μA (typ.)/3.3V
- Three-state outputs for wired-OR expansion
- Full static operation
- All inputs and outputs are directly TTL-compatible
- Flash memory pinout compatible with AMD (A23L06161) and Intel (A23L06162)
- Available in 44-pin SOP, 48-pin TSOP (forward, reverse type and flash memory's pinouts compatible) packages

Pin Configurations

■ **SOP**



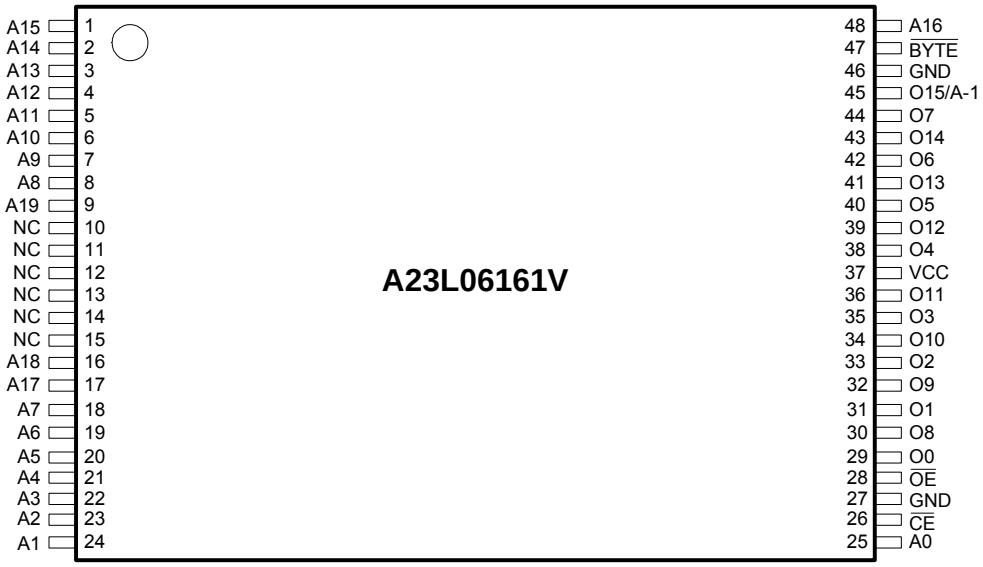
■ **TSOP (forward type)**



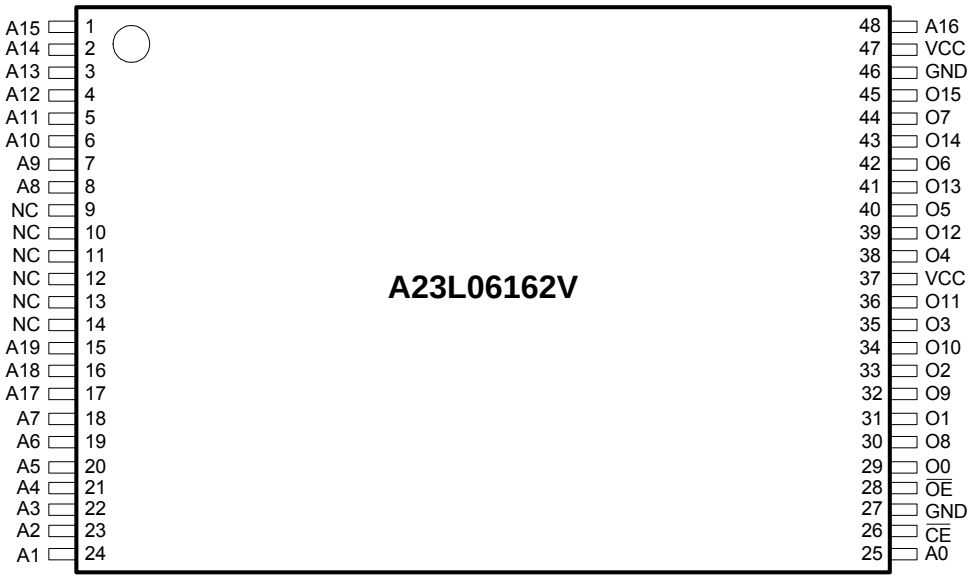
■ **TSOP (reverse type)**

Pin Configurations (continued)

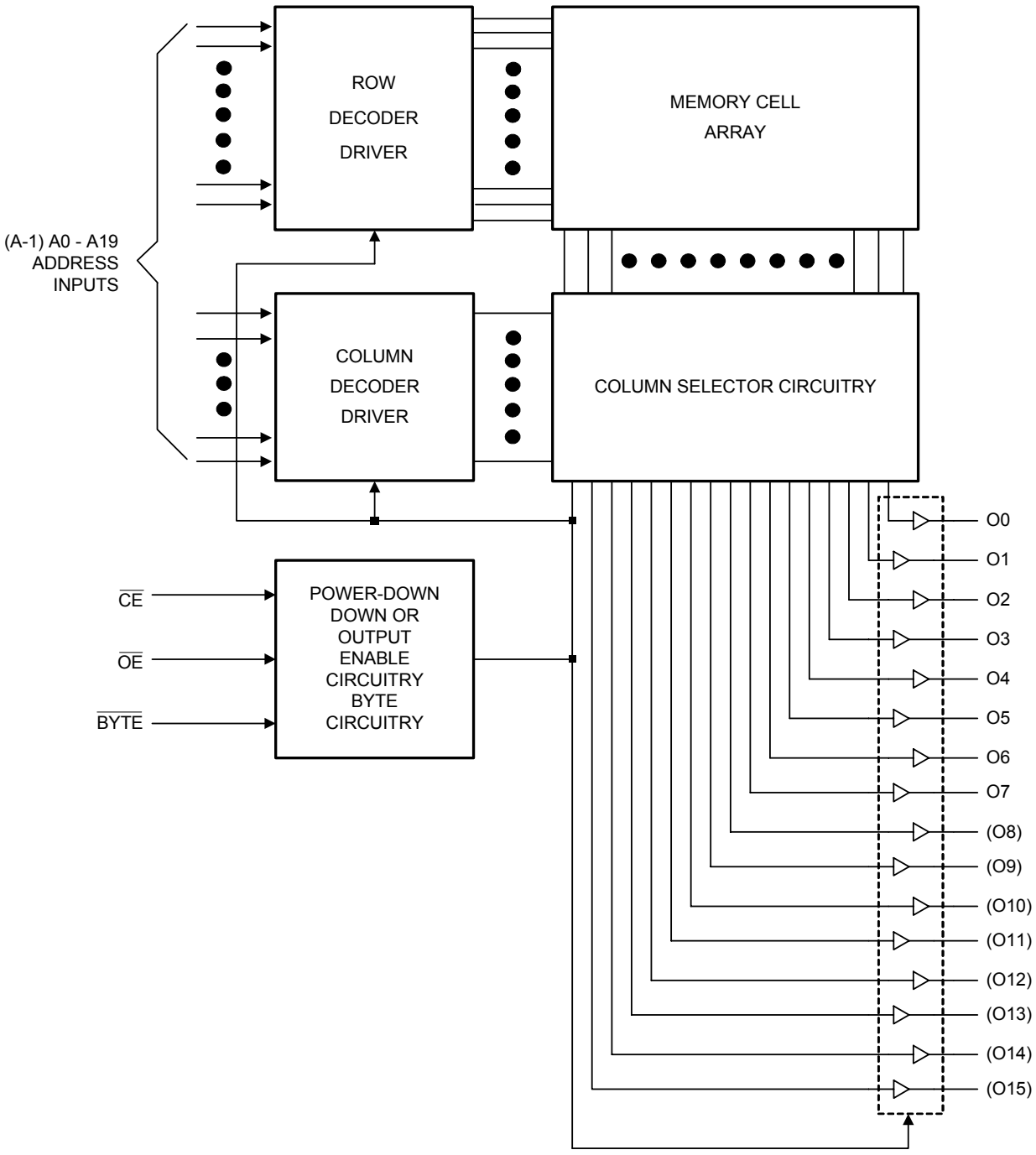
■ **TSOP (forward type)**



■ **TSOP (forward type)**



Block Diagram



Pin Descriptions

Pin No.				Symbol	Description
44L SOP (A23L0616)	48L TSOP (A23L0616)	48L TSOP (A23L06161)	48L TSOP (A23L06162)		
2-11, 34-43	2-11, 14-23	1-9, 16-25, 48	1-8, 15-25, 48	A0-A19	Address Inputs
15-22, 24-30	28-35, 39-45	29-36, 38-44	29-36, 38-44	O0-O14	Data Outputs
31	46	45	45	O15/A-1	Output 15(WORD mode) /LSB Address (BYTE mode)
12	24	26	26	$\overline{CE}$	Chip Enable Input
14	27	28	28	$\overline{OE}$	Output Enable Input
33	1	47	-	$\overline{BYTE}$	BYTE or WORD mode Selection
23	37-38	37	37, 47	VCC	Power Supply
13, 32	12, 25-26, 47-48	27, 46	27, 46	GND	Ground
1, 44	13, 36	10-15	9-14	NC	No Connection

Recommended DC Operating Conditions

(T_A = 0°C to + 70°C)

Symbol	Parameter	Min.	Max.	Unit
VCC	Supply Voltage	2.7	3.6	V
GND	Ground	0	0	V
V_{IH}	Input High Voltage	2.2	VCC+0.3	V
V_{IL}	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_A = 0°C to + 70°C, VCC = 2.7V~3.6V, GND = 0V for -70)

Symbol	Parameter	Min.	Max.	Unit	Conditions	Note
V_{OH}	Output High Voltage	2.4		V	I_{OH} = -0.4mA (3V)	
V_{OL}	Output Low Voltage		0.4	V	I_{OL} = 1.6mA (3V)	
V_{IH}	Input High Voltage	2.2	VCC + 0.3	V		
V_{IL}	Input Low Voltage	-0.3	0.6	V		
$\lvert I_{LI} \rvert$	Input Leakage Current		+10	μA	VCC = max. V_{IN} = VCC to GND	
$\lvert I_{LO} \rvert$	Output Leakage Current		+10	μA	VCC = max. V_{OUT} = VCC to GND	1
I_{CC}	Operating Supply Current		60	mA	t_{CYC} = min.	2
I_{SB}	Standby Supply Current (TTL)		1.5	mA	$\overline{CE}$ = V_{IH}	
I_{SB1}	Standby Supply Current (CMOS)		30	μA	$\overline{CE}$ ≥ VCC - 0.2V	

Capacitance

Symbol	Parameter	Min.	Max.	Unit	Test Conditions	Note
C_I	Input Capacitance		10	pF	T_A = 25°C f = 1.0MHz	3
C_O	Output Capacitance		10	pF		

AC Characteristics (T_A = 0°C to +70°C, VCC = 2.7V~3.6V for -70, GND = 0V)

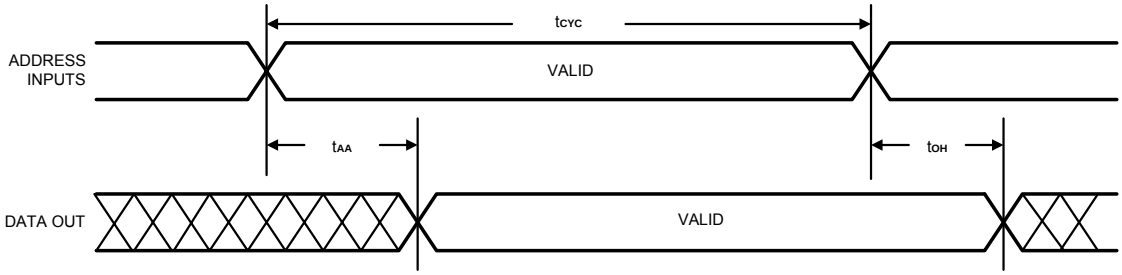
Symbol	Parameter	A23L0616/A23L06161/ A23L06162-70		Unit	Note
		Min.	Max.		
t_{CYC}	Cycle Time	70		ns	
t_{AA}	Address Access Time		70	ns	
t_{ACE}	Chip Enable Access Time		75	ns	
t_{AOE}	Output Enable Access Time		30	ns	
t_{OH}	Output Hold after Address Change	10		ns	
t_{LZ}	Output Low Z Delay	10		ns	4, 6
t_{HZ}	Output High Z Delay*		20	ns	5, 6

* t_{HZ} is specified from either $\overline{OE}$ or $\overline{CE}$ going disabled, whichever occurs first.

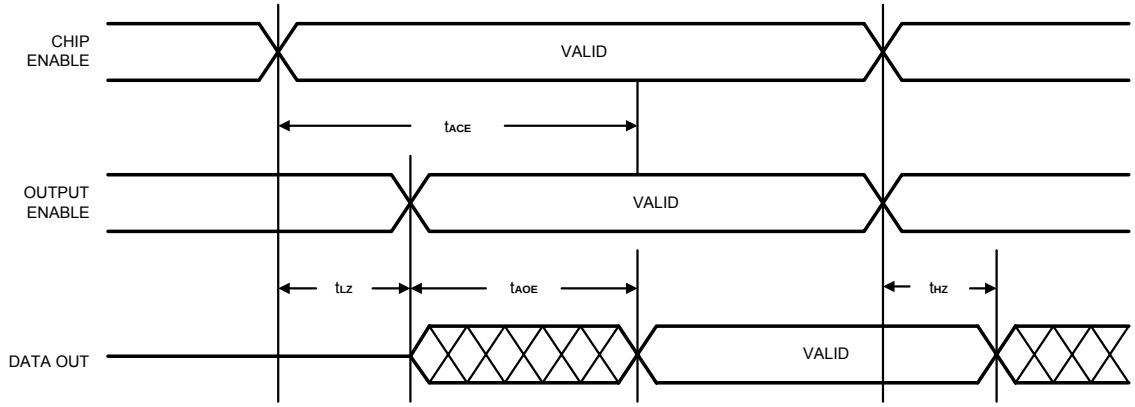
Notes:
1. $\overline{OE}$ / $\overline{CE}$ = V_{IH} (Output is unloaded)
2. V_{IN} = V_{IH}/V_{IL}, $\overline{OE}$ / $\overline{CE}$ = V_{IL} (Output is unloaded)
3. This parameter is periodically sampled and is not 100% tested. All pins, except pins under test, are tied to AC ground.
4. Output LOW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



AC Test Conditions

Part No.	A23L0616/A23L06161/A23L06162-70
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_{IN} = 1.4V, V_{OUT} = 1.4V
Output Load	1 TTL gate and C_L = 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

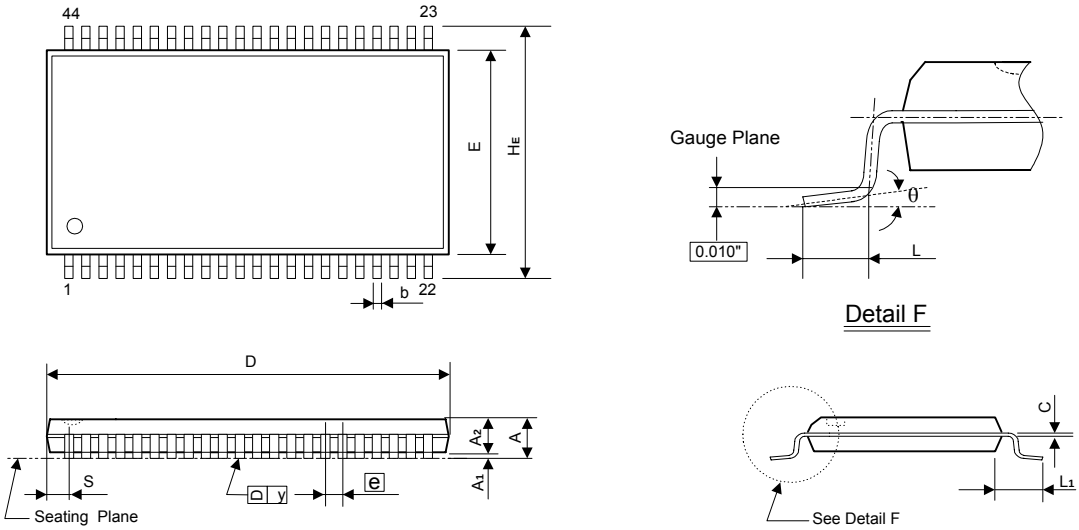
Ordering Information

Part No.	Access Time (ns)	Package
A23L0616M-70	70	44L SOP
A23L0616V-70	70	48L TSOP (Forward)
A23L0616R-70	70	48L TSOP (Reverse)
A23L06161V-70	70	48L TSOP AMD (Flash Compatible)
A23L06162V-70	70	48L TSOP Intel (Flash Compatible)

Package Information

SOP 44L Outline Dimensions

unit: inches/mm

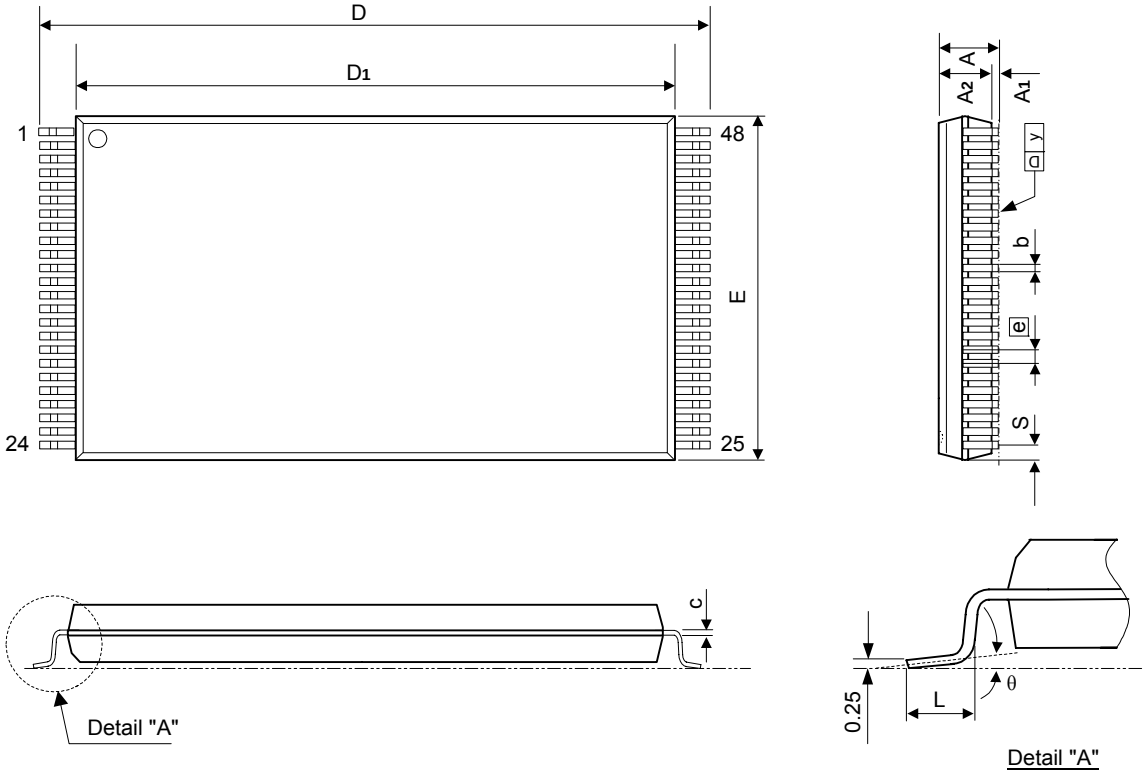


Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	-	-	0.118	-	-	3.00
A_1	0.004	-	-	0.10	-	-
A_2	0.103	0.106	0.109	2.62	2.69	2.77
b	0.013	0.016	0.020	0.33	0.40	0.50
C	0.007	0.008	0.010	0.18	0.20	0.25
D	-	1.122	1.130	-	28.50	28.70
E	0.490	0.496	0.500	12.45	12.60	12.70
e	-	0.050	-	-	1.27	-
H_E	0.620	0.631	0.643	15.75	16.03	16.33
L	0.024	0.032	0.040	0.61	0.80	1.02
L_1	-	0.0675	-	-	1.71	-
S	-	-	0.045	-	-	1.14
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 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_1	0.002	-	0.006	0.05	-	0.15
A_2	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_1	0.720	0.724	0.728	18.30	18.40	18.50
E	-	0.472	0.476	-	12.00	12.10
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.