



## **A23L8316/A23L83161 Series**

***Preliminary***

***256K X 16 / 512K X 8 BIT CMOS MASK ROM***

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### **Document Title**

**256K X 16 / 512K X 8 BIT CMOS MASK ROM**

### **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	July 28, 2004	Preliminary



# A23L8316/A23L83161 Series

**Preliminary**

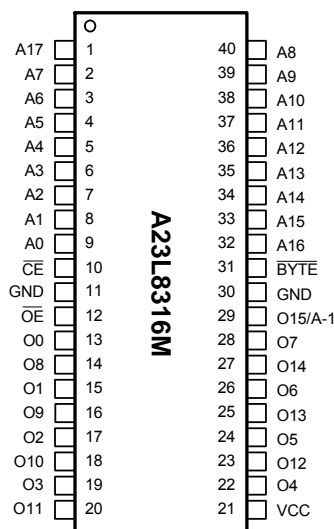
**512K X 16 / 1M X 8 BIT CMOS MASK ROM**

## Features

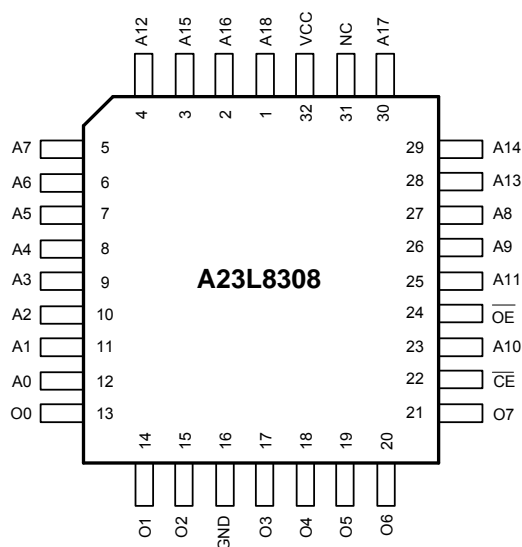
- 256K x 16 bit or 512K x 8 bit organization
- Supply voltage range: 2.7V~3.6V
- Access time: 70ns (max.)/3.0V~3.6V  
100ns (max.)/2.7V~3.6V
- Current: Operating: 20mA (typ.)/3.3V  
Standby: 10μA (typ.)/3.3V
- Three-state outputs for wired-OR expansion
- Full static operation
- All inputs and outputs are directly TTL-compatible
- Flash memory pinout compatible with AMD (A23L83161)
- Available in 40-pin SOP, 32-pin PLCC 48-pin TSOP (forward, reverse type and flash memory's pinouts compatible) packages

## Pin Configurations

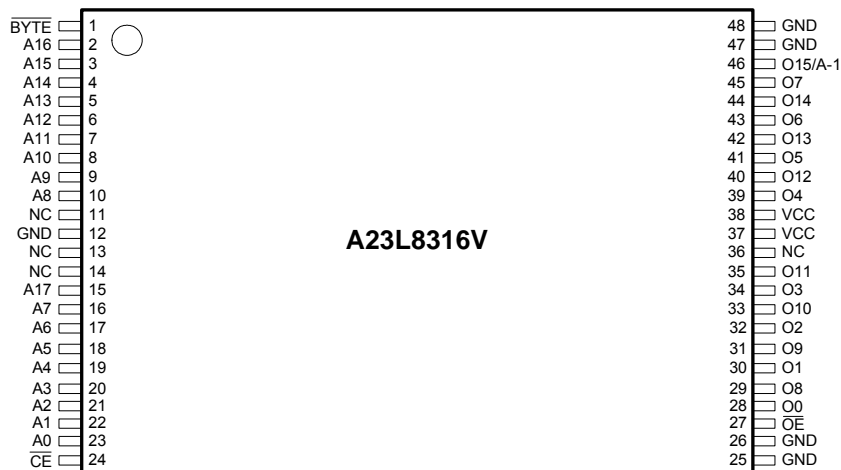
### ■ SOP

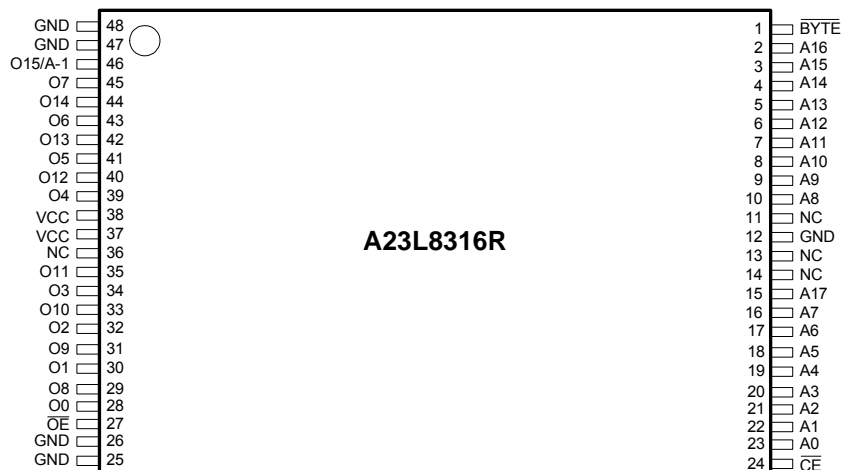
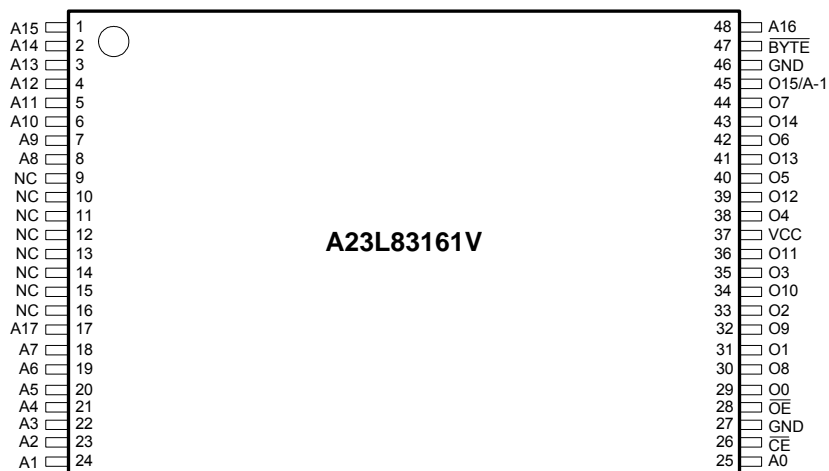


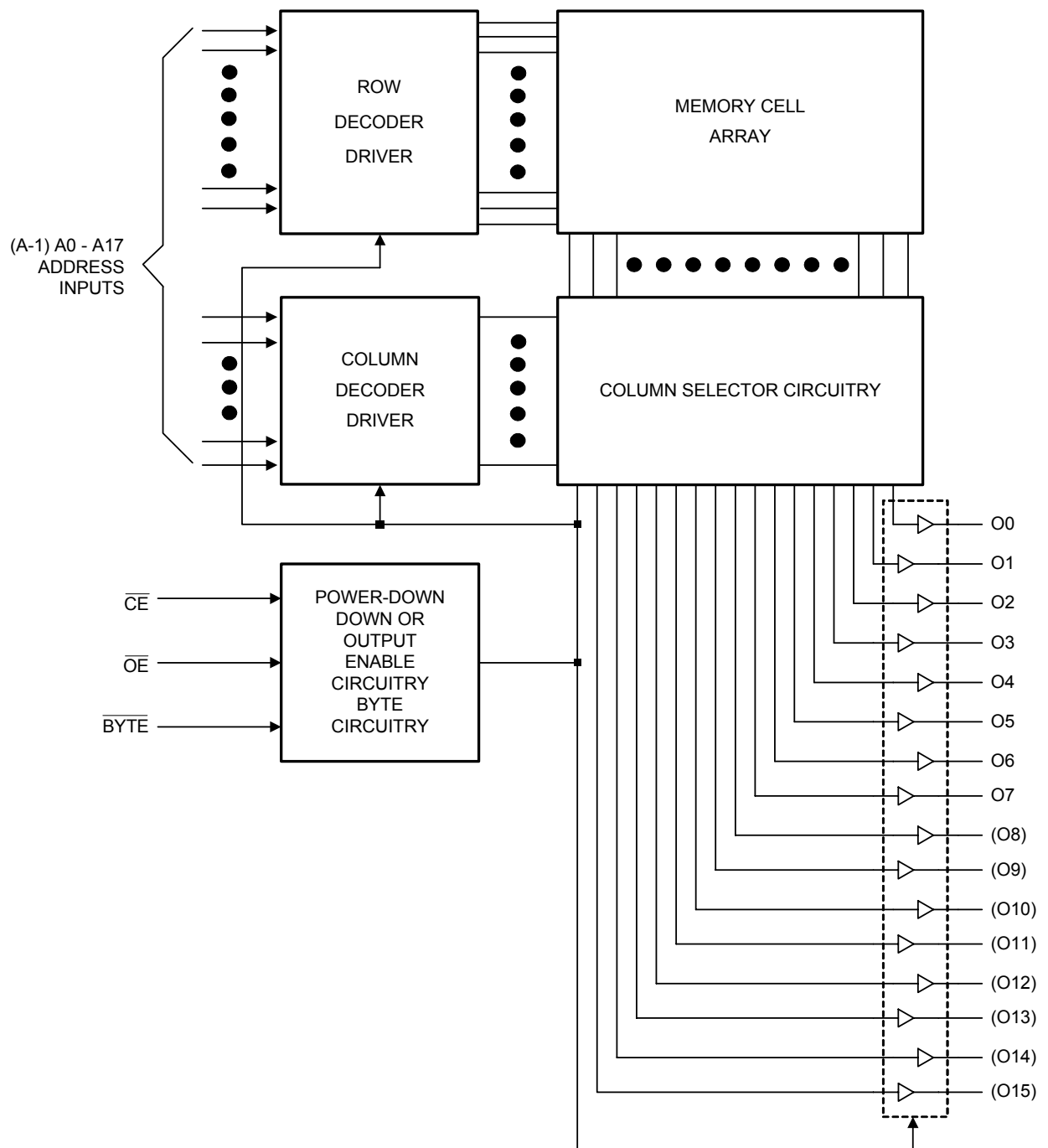
### ■ PLCC



### ■ TSOP (forward type)



**Pin Configurations (continued)**
**■ TSOP (reverse type)**

**■ TSOP (forward type)**


**Block Diagram**


**Pin Descriptions**

Pin No.				Symbol	Description
32L PLCC (A23L8316)	40L SOP (A23L8316)	48L TSOP (A23L8316)	48L TSOP (A23L83161)		
1-12, 23, 25-30	1-9, 32-40	2-10, 15-23	1-8, 17-25, 48	A0-A17	Address Inputs
13-15, 17-21	13-20, 22-28	28-35, 39-45	29-36, 38-44	O0-O14	Data Outputs
-	29	46	45	O15/A-1	Output 15(WORD mode) /LSB Address (BYTE mode)
22	10	24	26	$\overline{\text{CE}}$	Chip Enable Input
24	12	27	28	$\overline{\text{OE}}$	Output Enable Input
-	31	1	47	$\overline{\text{BYTE}}$	BYTE or WORD mode Selection
32	21	37-38	37	VCC	Power Supply
16	11, 30	12, 25-26, 47-48	27, 46	GND	Ground
31	-	11, 13-14, 36	9-16	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**

(TA = 0°C to + 70°C, VCC = 2.7V~3.6V, GND = 0V for -100, VCC = 3.0V~3.6V, GND = 0 for -70)

Symbol	Parameter	Min.	Max.	Unit	Conditions	Note
VOH	Output High Voltage	2.4		V	IOH = -0.4mA (3V)	
VOL	Output Low Voltage		0.4	V	IOL = 1.6mA (3V)	
VIH	Input High Voltage	2.2	VCC + 0.3	V		
VIL	Input Low Voltage	-0.3	0.6	V		
ILI	Input Leakage Current		+10	μA	VCC = max. VIN = VCC to GND	
ILO	Output Leakage Current		+10	μA	VCC = max. VOUT = VCC to GND	1
ICC	Operating Supply Current		30	mA	tcyc = min.	2
ISB	Standby Supply Current (TTL)		1.5	mA	$\overline{CE} = V_{IH}$	
ISB1	Standby Supply Current (CMOS)		10	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 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 for -100, VCC = 3.0V~3.6V for -70, GND = 0V)

Symbol	Parameter	A23L8316/A23L83161 -70		A23L8316/A23L83161 -100		Unit	Note
		Min.	Max.	Min.	Max.		
t <sub>cyc</sub>	Cycle Time	70		100		ns	
t <sub>AA</sub>	Address Access Time		70		100	ns	
t <sub>ACE</sub>	Chip Enable Access Time		70		100	ns	
t <sub>AOE</sub>	Output Enable Access Time		35		50	ns	
t <sub>OH</sub>	Output Hold after Address Change	10		10		ns	
t <sub>LZ</sub>	Output Low Z Delay	10		10		ns	4, 6
t <sub>HZ</sub>	Output High Z Delay*		20		20	ns	5, 6

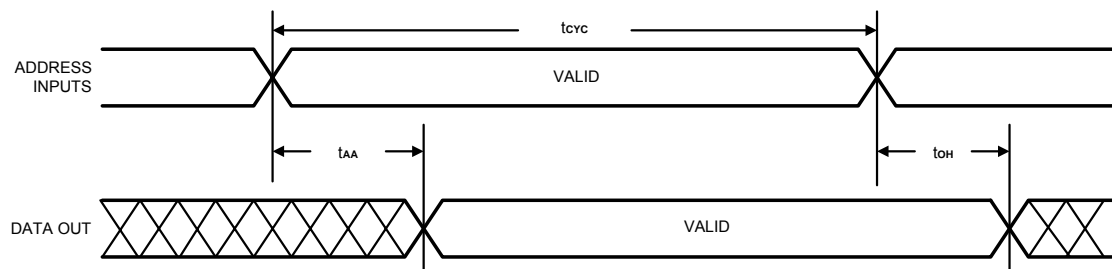
\* t<sub>HZ</sub> is specified from either  $\overline{OE}$  or  $\overline{CE}$  going disabled, whichever occurs first.

**Notes:**

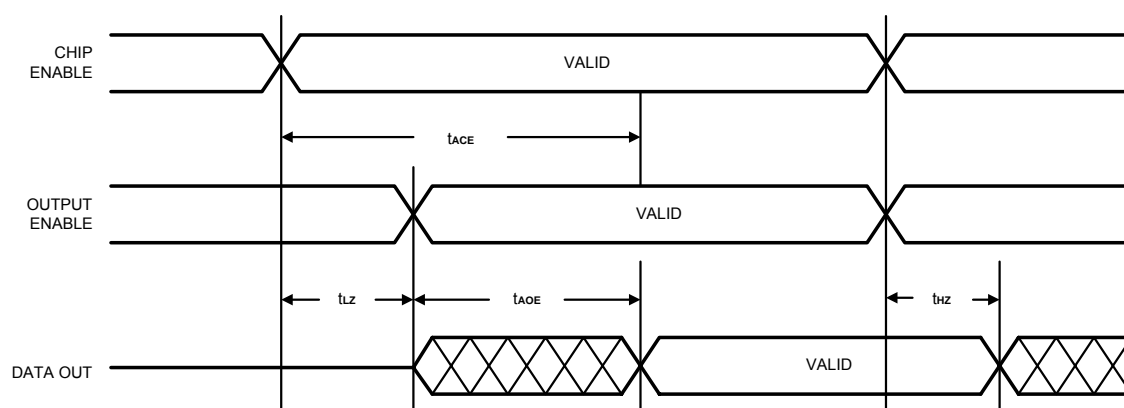
1.  $\overline{OE} / \overline{CE} = V_{IH}$  (Output is unloaded)
2.  $V_{IN} = V_{IH}/V_{IL}$ ,  $\overline{OE} / \overline{CE} = V_{IL}$  (Output is unloaded)
3. This parameter is periodically sampled and is not 100% tested. All pins, except pins under test, are tied to AC ground.
4. Output LOW impedance 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)



## AC Test Conditions

Part No.	A23L8316/A23L83161 -70	A23L8316/A23L83161 -100
Applied Voltage	3.0V~3.6V	2.7V~3.6V
Input Pulse Levels	0.4V to 2.4V	0.4V to 2.4V
Input Rise and Fall Time	10 ns	10 ns
Timing Measurement Reference Level	$V_{IN} = 1.4V$ , $V_{OUT} = 1.4V$	$V_{IN} = 1.4V$ , $V_{OUT} = 1.4V$
Output Load	1 TTL gate and $C_L = 100pF$	1 TTL gate and $C_L = 100pF$



**Function Table**

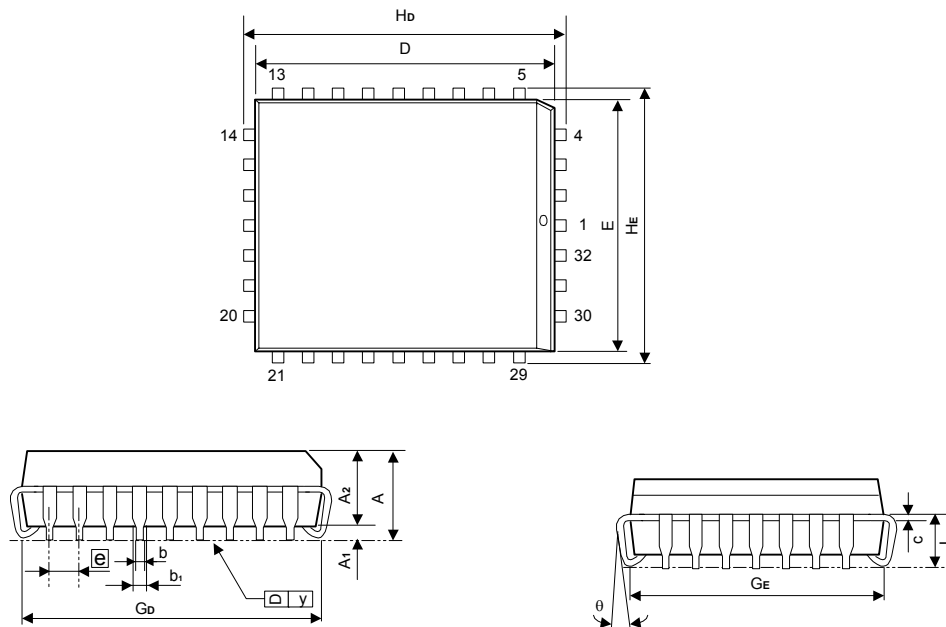
$\overline{\text{CE}}$	$\overline{\text{OE/NC}}$	$\overline{\text{BYTE}}$	O15/A-1	O0 - O7	O8 - O15	Mode
L	L	H	Data Pin O15	Data Out	Data out	Word
L	L	L	LSB Address A-1	Data Out	Hi - Z	Byte
H	X	X	X	Hi - Z	Hi - Z	Power-down
L	H	X	X	Hi - Z	Hi - Z	Output Disable

**Ordering Information**

Part No.	Access Time (ns)	Package
A23L8316M-70	70	40L SOP
A23L8316M-100	100	40L SOP
A23L8316V-70	70	48L TSOP (Forward)
A23L8316V-100	100	48L TSOP (Forward)
A23L8316R-70	70	48L TSOP (Reverse)
A23L8316R-100	100	48L TSOP (Reverse)
A23L83161V-70	70	48L TSOP AMD (Flash Compatible)
A23L83161V-100	100	48L TSOP AMD (Flash Compatible)

**Package Information**
**PLCC 32L Outline Dimension**

unit: inches/mm



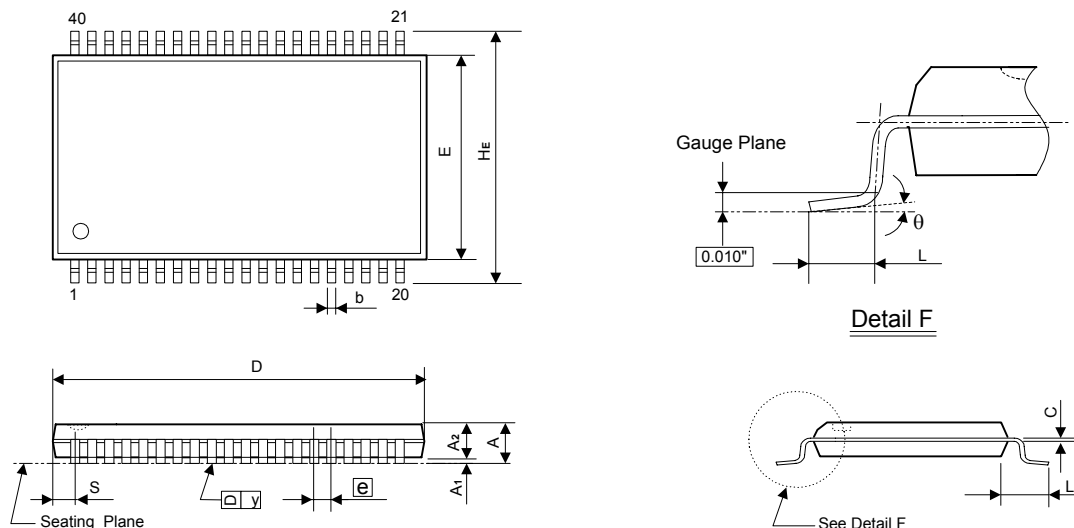
Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	-	-	0.134	-	-	3.40
A1	0.0185	-	-	0.47	-	-
A2	0.105	0.110	0.115	2.67	2.80	2.93
b <sub>1</sub>	0.026	0.028	0.032	0.66	0.71	0.81
b	0.016	0.018	0.021	0.41	0.46	0.54
C	0.008	0.010	0.014	0.20	0.254	0.35
D	0.547	0.550	0.553	13.89	13.97	14.05
E	0.447	0.450	0.453	11.35	11.43	11.51
e	0.044	0.050	0.056	1.12	1.27	1.42
G <sub>D</sub>	0.490	0.510	0.530	12.45	12.95	13.46
G <sub>E</sub>	0.390	0.410	0.430	9.91	10.41	10.92
H <sub>D</sub>	0.585	0.590	0.595	14.86	14.99	15.11
H <sub>E</sub>	0.485	0.490	0.495	12.32	12.45	12.57
L	0.075	0.090	0.095	1.91	2.29	2.41
y	-	-	0.003	-	-	0.075
θ	0°	-	10°	0°	-	10°

**Notes:**

1. Dimensions D and E do not include resin fins.
2. Dimensions G<sub>D</sub> & G<sub>E</sub> are for PC Board surface mount pad pitch design reference only.

**Package Information**
**SOP 40L Outline Dimensions**

unit: inches/mm



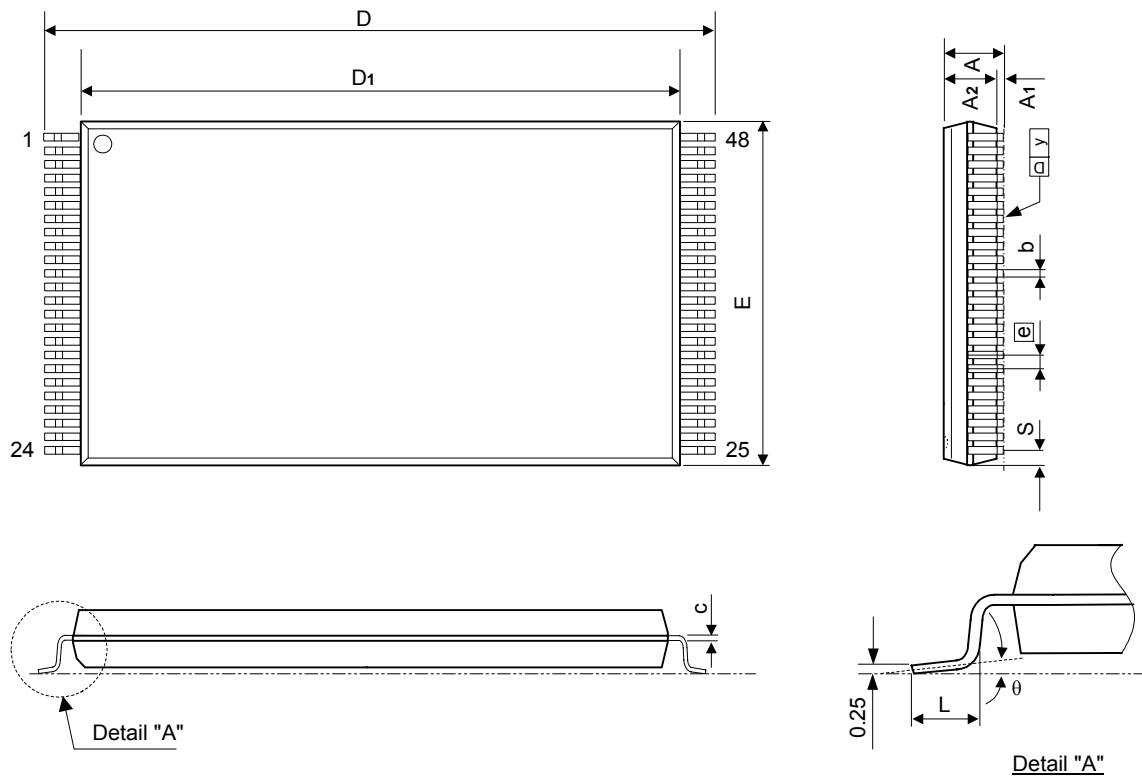
Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	-	-	0.118	-	-	3.00
A <sub>1</sub>	0.004	-	-	0.10	-	-
A <sub>2</sub>	0.101	0.106	0.111	2.57	2.69	2.82
b	0.014	0.016	0.020	0.36	0.41	0.51
C	0.006	0.008	0.012	0.15	0.20	0.31
D	1.021	1.026	1.031	25.93	26.06	26.19
E	0.440	0.445	0.450	11.18	11.30	11.43
e	-	0.050	-	-	1.27	-
HE	0.546	0.556	0.566	13.87	14.12	14.38
L	0.024	0.032	0.040	0.61	0.80	1.02
L <sub>1</sub>	0.047	0.055	0.063	1.19	1.40	1.60
S	-	0.038	0.046	-	0.97	1.17
y	-	-	0.004	-	-	0.10
$\theta$	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 <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
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.