LP61L256B Series

32K X 8 Bit High SPEED LOW VCC CMOS SRAM

Features

- Single +3.3 volt power supply
- Access times: 12 ns (max.)
- Current: Operating: 100mA (max.)
  Standby: 10mA (max.)
- Full static operation, no clock or refreshing required
- All inputs and outputs directly TTL compatible
- Common I/O using three-state output
- Data retention voltage: 2V (min.)
- Available in 28-pin SOJ and TSOP packages

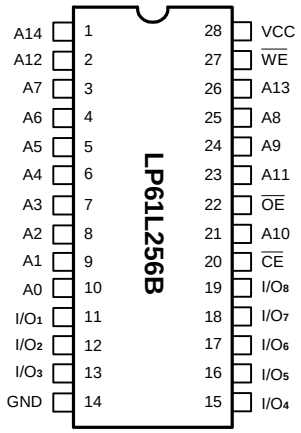
General Description

The LP61L256B is a high-speed, low-power 262,144-bit static random access memory organized as 32,768 words by 8 bits that operates on a single 3.3V power supply. Input and three-state outputs are TTL compatible and allow for direct interfacing with common system bus structures.

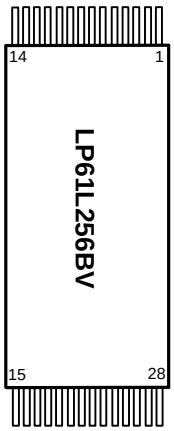
Minimum standby power is drawn by this device when $\overline{CE}$ is at a high level, independent of the other input levels. Data retention is guaranteed at a power supply voltage as low as 2V.

Pin Configurations

■ **SOJ**

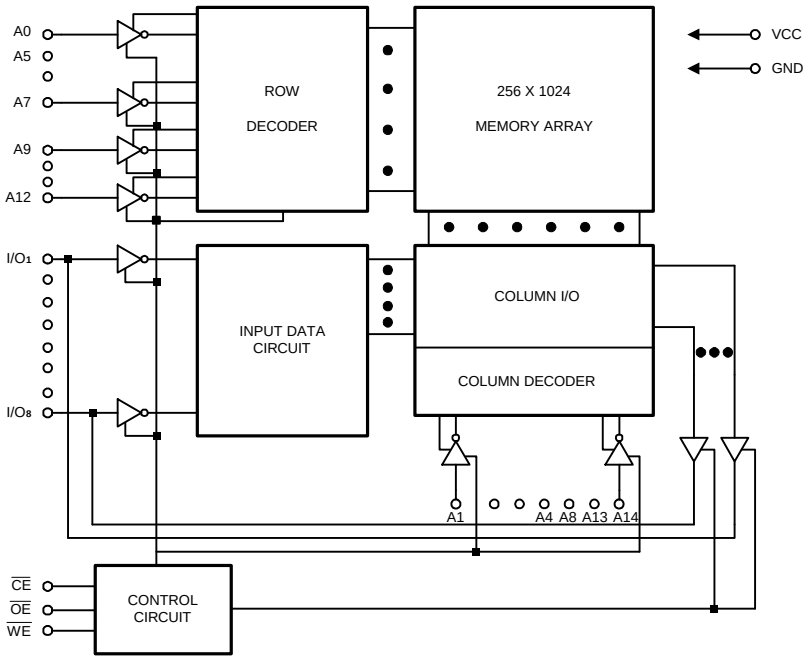


■ **TSOP**



Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pin Name	$\overline{OE}$	A11	A9	A8	A13	$\overline{WE}$	VCC	A14	A12	A7	A6	A5	A4	A3
Pin No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Pin Name	A2	A1	A0	I/O_1	I/O_2	I/O_3	GND	I/O_4	I/O_5	I/O_6	I/O_7	I/O_8	$\overline{CE}$	A10

Block Diagram



Pin Descriptions -SOJ

Pin No.	Symbol	Description
1 - 10, 21, 23 - 26	A0 - A14	Address Inputs
11 - 13, 15 - 19	I/O1 - I/O8	Data Inputs/Outputs
14	GND	Ground
20	$\overline{CE}$	Chip Enable
22	$\overline{OE}$	Output Enable
27	$\overline{WE}$	Write Enable
28	VCC	Power Supply (+3.3V)

Pin Description - TSOP

Pin No.	Symbol	Description
1	$\overline{OE}$	Output Enable
2 - 5, 8 - 17, 28	A0 - A14	Address Inputs
6	$\overline{WE}$	Write Enable
7	VCC	Power Supply
18 - 20, 22 - 26	I/O1 - I/O8	Data Inputs/Outputs
21	GND	Ground
27	$\overline{CE}$	Chip Enable

Recommended DC Operating Conditions

(T_A = 0°C to + 70°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
VCC	Supply Voltage	3.0	3.3	3.6	V
GND	Ground	0	0	0	V
V_{IH}	Input High Voltage	2.2	-	VCC + 0.3	V
V_{IL}	Input Low Voltage	-0.3	0	0.8	V
C_L	Output Load	-	-	30	pF
TTL	Output Load	-	-	1	-

Absolute Maximum Ratings*

VCC to GND . . . . . -0.5V to +4.6V
IN, IN/OUT Volt to GND . . . . . -0.3V to VCC +0.3V
Operating Temperature, Topr . . . . . 0°C to +70°C
Storage Temperature, Tstg . . . . . -55°C to +125°C
Power Dissipation, Pt 1.0W

*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 = 3.3V ± 10%, GND = 0V)

Symbol	Parameter	LP61L256B-12		Unit	Conditions
		Min.	Max.		
$\lvert I_{LI} \rvert$	Input Leakage Current	-	2	µA	V_{IN} = GND to VCC
$\lvert I_{LO} \rvert$	Output Leakage Current	-	2	µA	$\overline{CE}$ = V_{IH} or $\overline{OE}$ = V_{IH} $V_{I/O}$ = GND to VCC
I_{CC1} (1)	Dynamic Operating Current	-	100	mA	$\overline{CE}$ = V_{IL}, $I_{I/O}$ = 0 mA
I_{SB}	Standby Power Supply Current	-	20	mA	$\overline{CE}$ = V_{IH}
I_{SB1}		-	10	mA	$\overline{CE}$ ≥ VCC - 0.2V V_{IN} ≥ VCC - 0.2V or V_{IN} ≤ 0.2V
V_{OL}	Output Low Voltage	-	0.4	V	I_{OL} = 8 mA
V_{OH}	Output High Voltage	2.4	-	V	I_{OH} = -4 mA

Notes: 1. I_{CC1} is dependent on output loading, cycle rates, and Read/Write patterns.

Truth Table

Mode	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	I/O Operation	Supply Current
Standby	H	X	X	High Z	I_{SB}, I_{SB1}
Output Disable	L	H	H	High Z	I_{CC1}
Read	L	L	H	D_{OUT}	I_{CC1}
Write	L	X	L	D_{IN}	I_{CC1}

Capacitance (T_A = 25°C, f = 1.0 MHz)

Symbol	Parameter	Min.	Max.	Unit	Conditions
C_{IN}*	Input Capacitance	-	10	pF	V_{IN} = 0 V
$C_{I/O}$*	Input/Output Capacitance	-	10	pF	$V_{I/O}$ = 0 V

* These parameters are sampled and not 100% tested.

AC Characteristics (T_A = 0°C to + 70°C, VCC = 3.3V ± 10%)

Symbol	Parameter	LP61L256B-12		Unit
		Min.	Max.	
Read Cycle				
t_{RC}	Read Cycle Time	12	-	ns
t_{AA}	Address Access Time	-	12	ns
t_{ACE}	Chip Enable Access Time	-	12	ns
t_{OE}	Output Enable to Output Valid	-	7	ns
t_{CLZ}	Chip Enable to Output in Low Z	2	-	ns
t_{OLZ}	Output Enable to Output in Low Z	2	-	ns
t_{CHZ}	Chip Disable to Output in High Z	0	7	ns
t_{OHZ}	Output Disable to Output in High Z	2	6	ns
t_{OH}	Output Hold from Address Change	2	-	ns

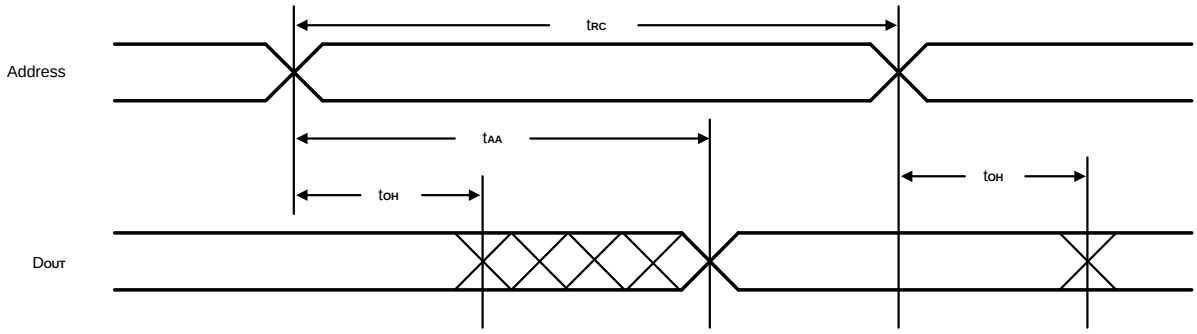
AC Characteristics (continued)

Symbol	Parameter	LP61L256B-12		Unit
		Min.	Max.	
Write Cycle				
t_{WC}	Write Cycle Time	12	-	ns
t_{CW}	Chip Enable to End of Write	10	-	ns
t_{AS}	Address Setup Time of Write	0	-	ns
t_{AW}	Address Valid to End of Write	10	-	ns
t_{WP}	Write Pulse Width	8	-	ns
t_{WR}	Write Recovery Time	0	-	ns
t_{WHZ}	Write to Output in High Z	0	7	ns
t_{DW}	Data to Write Time Overlap	8	-	ns
t_{DH}	Data Hold from Write Time	0	-	ns
t_{OW}	Output Active from End of Write	5	-	ns

Notes: t_{CHZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit condition and are not referred to output voltage levels.

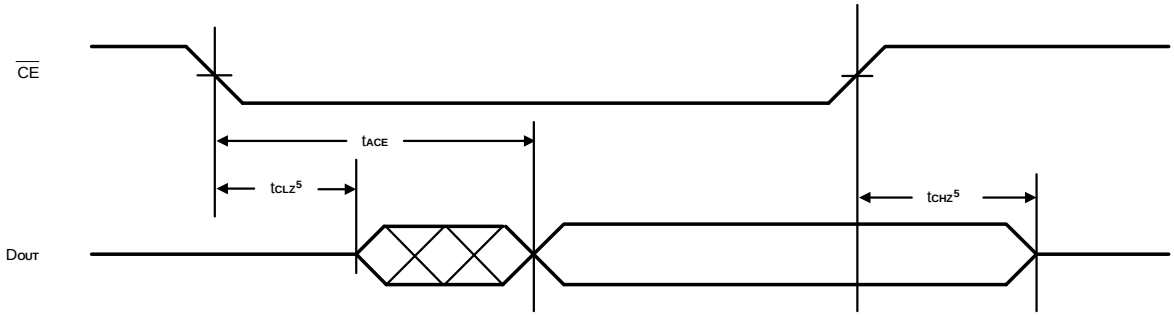
Timing Waveforms

Read Cycle 1 (1, 2, 4)

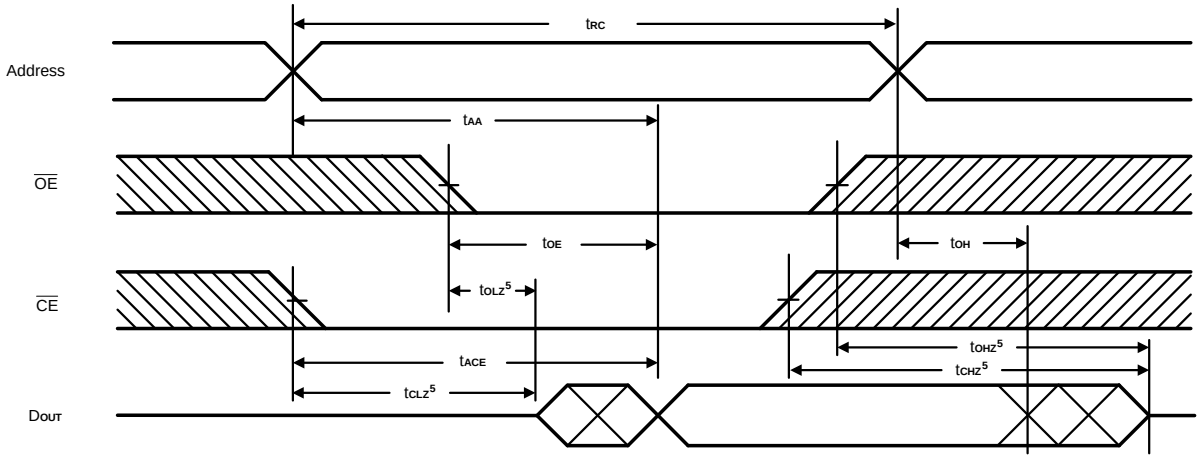


Timing Waveforms (continued)

Read Cycle 2[1, 3, 4]



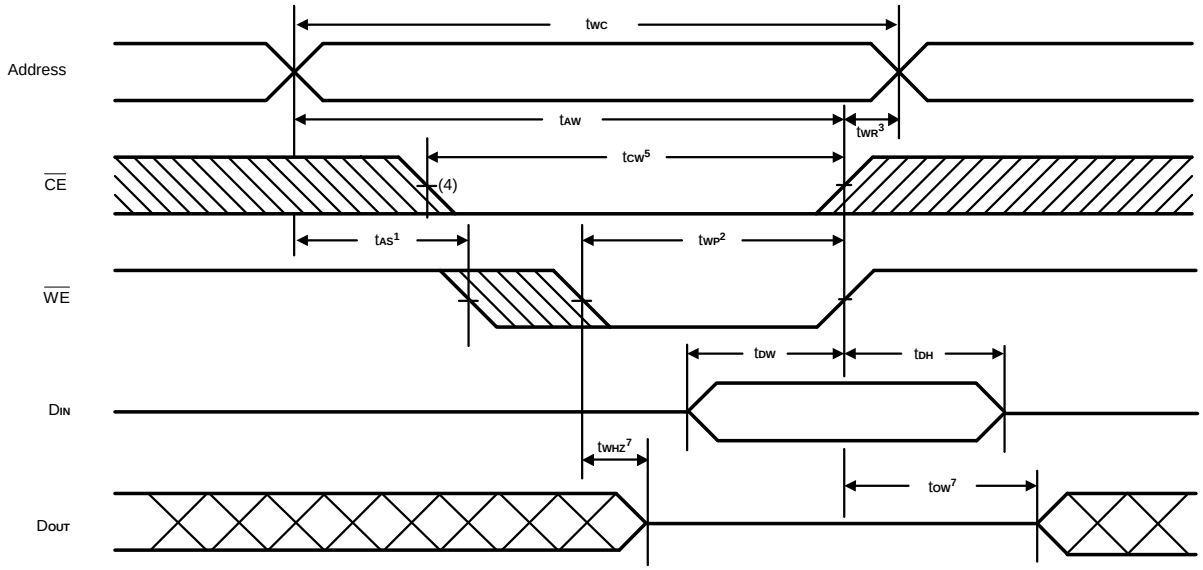
Read Cycle 3[1]



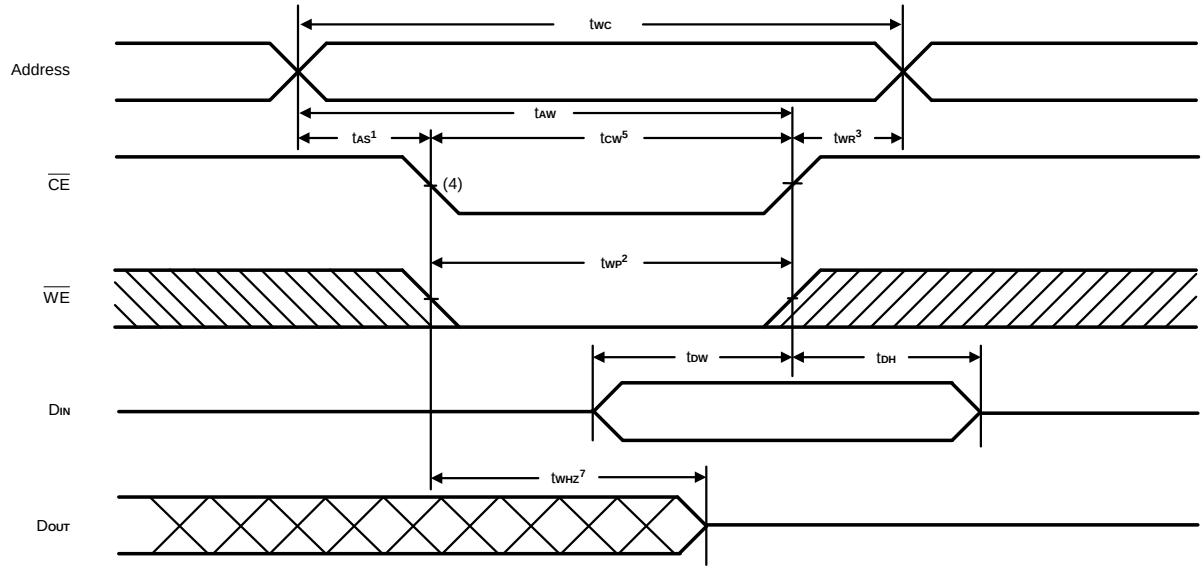
Note: 1. $\overline{WE}$ is high for Read cycle.
2. Device is continuously enabled, $\overline{CE}$ = V_{IL}.
3. Address valid prior to or coincident with $\overline{CE}$ transition low.
4. $\overline{OE}$ = V_{IL}.
5. Transition is measured ±200mV from steady state. This parameter is sampled and not 100% tested.

Timing Waveforms (continued)

Write Cycle[6]
(Write Enable Controlled)



Write Cycle 2
(Chip Enable Controlled)



Notes: 1. t_{AS} is measured from address valid to the beginning of Write.
2. A Write occurs during the overlap (t_{WP}) of a low $\overline{CE}$ and a low $\overline{WE}$.
3. t_{WR} is measured from $\overline{CE}$ or $\overline{WE}$ going high to the end of the Write cycle.
4. If the $\overline{CE}$ low transition occurs simultaneously with the $\overline{WE}$ low transition or after the $\overline{WE}$ transition, outputs remain in a high impedance state.
5. t_{CW} is measured from $\overline{CE}$ going low to the end of Write.
6. $\overline{OE}$ is continuously low ($\overline{OE}$ = V_{IL}).
7. Transition is measured ±200mV from steady state. This parameter is sampled and not 100% tested.

AC Test Conditions

Input Pulse Levels	0V - 3V
Input Rise and Fall Times	3 ns
Input and Current Timing Reference Levels	1.5V
Output Load	See Figures 1, 2 and 3

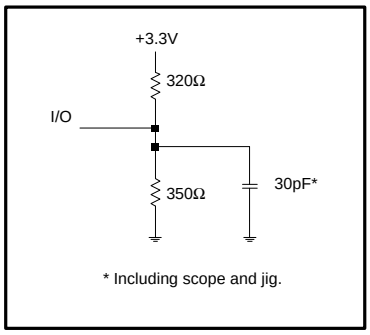


Figure 1. Output Load

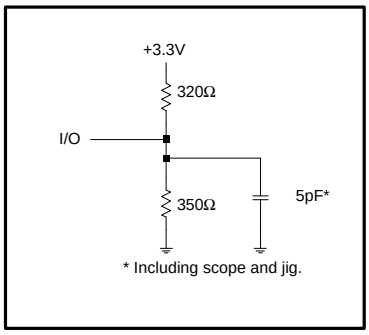


Figure 2. Output Load for t_{CLZ}, t_{OLZ}, t_{CHZ}, t_{OHZ}, t_{WHZ}, and t_{OW}

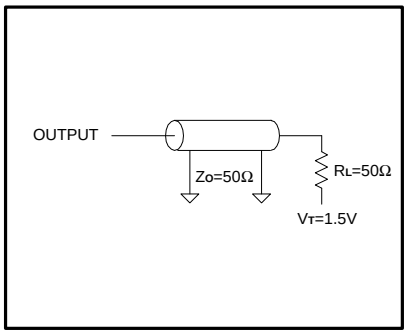
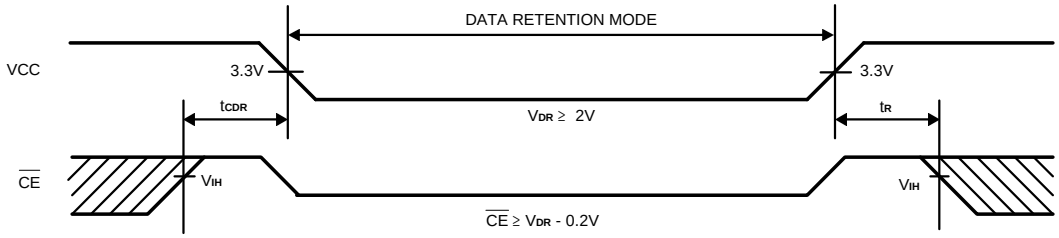


Figure 3. Output Load

Data Retention Characteristics (T_A = 0°C to 70°C)

Symbol	Parameter	Min.	Max.	Unit	Conditions
V_{DR}	VCC for Data Retention	2.0	3.6	V	$\overline{CE} \geq$ VCC - 0.2V
I_{CCDR}	Data Retention Current	-	0.5	mA	VCC = 2V, $\overline{CE} \geq$ VCC - 0.2V $V_{IN} \geq$ VCC - 0.2V or $V_{IN} \leq$ 0.2V
t_{CDR}	Chip Disable to Data Retention Time	0	-	ns	See Retention Waveform
t_R	Operation Recovery Time	5	-	ms	

Low VCC Data Retention Waveform



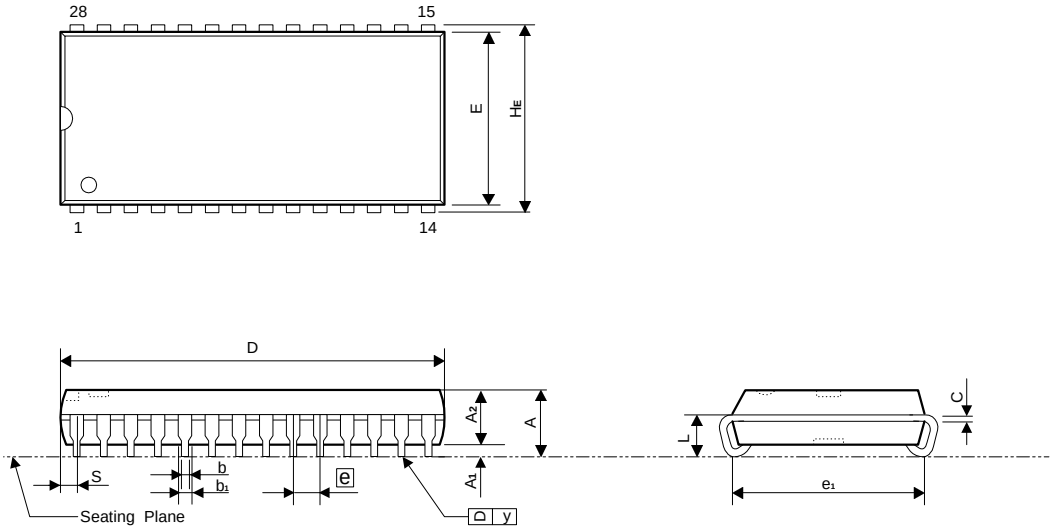
Ordering Information

Part No.	Access Time (ns)	Operating Current Max. (mA)	Standby Current Max. (mA)	Package
LP61L256BS-12	12	100	10	28L SOJ
LP61L256BV-12	12	100	10	28L TSOP

Package Information

SOJ 28L Outline Dimensions

unit: inches/mm



Symbol	Dimensions in inches	Dimensions in mm
A	0.140 Max.	3.56 Max.
A_1	0.027 Min.	0.69 Min.
A_2	0.100±0.005	2.54±0.13
b_1	0.028 Typ.	0.71 Typ.
b	0.018 Typ.	0.46 Typ.
C	0.010 Typ.	0.25 Typ.
D	0.710 Typ. (0.730 Max.)	18.03 Typ. (18.54 Max.)
E	0.300±0.005	7.62±0.13
e	0.050 Typ.	1.27 Typ.
e_1	0.265±0.010	6.73±0.25
H_E	0.337±0.008	8.56±0.20
L	0.087±0.10	2.21±0.25
S	0.045 Max.	1.14 Max.
y	0.004 Max.	0.10 Max.

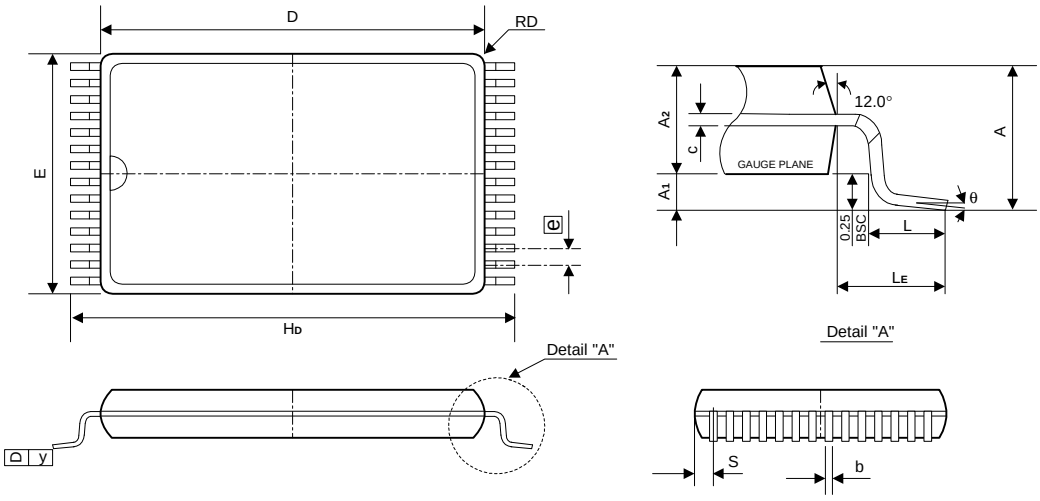
Notes:

1. The maximum value of dimension D includes end flash.
2. Dimension E does not include resin fins.
3. Dimension e_1 is for PC Board surface mount pad pitch design reference only.
4. Dimension S includes end flash.

Package Information

TSOP 28L TYPE I (8 X 13.4mm) Outline Dimensions

unit: inches/mm



Symbol	Dimensions in inches	Dimensions in mm
A	0.049 Max.	1.25 Max.
A_1	0.002 Min.	0.05 Min.
A_2	0.039±0.002	1.00±0.05
b	0.0079±0.0012	0.20±0.03
c	0.006±0.0003	0.15±0.008
D	0.465±0.004	11.80±0.10
E	0.315±0.004	8.00±0.10
e	0.0217 TYP.	0.55 TYP.
H_D	0.528±0.008	13.40±0.20
L	0.02±0.008	0.50±0.20
L_E	0.0266 TYP.	0.675 TYP.
S	0.0167 TYP.	0.425 TYP.
y	0.004 Max.	0.10 Max.
θ	0° ~ 6°	0° ~ 6°

Notes:

1. The maximum value of dimension D includes end flash.
2. Dimension E does not include resin fins.
3. Dimension e1 is for PC Board surface mount pad pitch design reference only.
4. Dimension S includes end flash.

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