Winbond Electronics Corp.

128K ´ 8 HIGH SPEED CMOS STATIC RAM

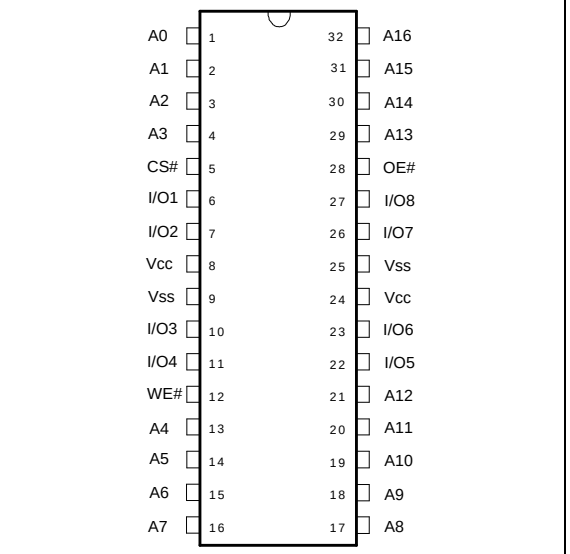
GENERAL DESCRIPTION

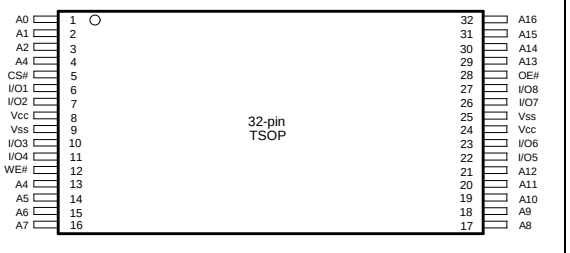
The W24L01A is a high speed, low power CMOS static RAM organized as 131072 x 8 bits that operates on a single 3.3-volt power supply.This device is manufactured using Winbond's high performance CMOS technology.

FEATURES

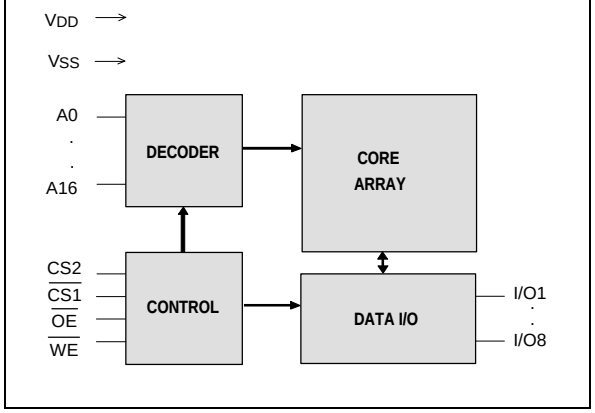
- High speed access time:10/12/15 nS (max.)
- Low power consumption:
  - Active: 300 mW (typ.)
- Single +3.3V power supply
- Three-state outputs
- All inputs and outputs directly TTL/LVTTL compatible
- Available packages: 32-pin 300 mil SOJ, and TSOP
- Optional temperature range: 0 to 70° C and -20 to 85° C

PIN CONFIGURATIIONS





BLOCK DIAGRAM



PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0 – A16	Address Inputs
I/O1 – I/O8	Data Inputs/Outputs
$\overline{CS}$	Chip Select Inputs
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
VDD	Power Supply
VSS	Ground
NC	No Connection

DC CHARACTERISTICS

Absolute Maximum Ratings

PARAMETER		RATING	UNIT
Supply Voltage to V_{SS} Potential		-0.5 to +4.6	V
Input/Output to V_{SS} Potential		-0.5 to V_{DD} +0.5	V
Allowable Power Dissipation		1.0	W
Storage Temperature		-65 to +150	°C
Operating Temperature	W24L01AXXXX	0 to +70	°C
	W24L01AXXXE	-20 to +85	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

TRUTH TABLE

$\overline{CS1}$	CS2	$\overline{OE}$	$\overline{WE}$	MODE	I/O1 - I/O8	V_{DD} CURRENT
H	X	X	X	Not Selected	High Z	ISB, ISB1
X	L	X	X	Not Selected	High Z	ISB, ISB1
L	H	H	H	Output Disable	High Z	IDD
L	H	L	H	Read	Data Out	IDD
L	H	X	L	Write	Data In	IDD

OPERATING CHARACTERISTICS

(V_{DD} = 3.3V ±5%, V_{SS} = 0V, T_A = 0 to 70° C for 10/12/15 nS: -20 to 85° C for 12/15 nS)

PARAMETER	SYM.	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Input Low Voltage	V_{IL}	-		-0.5	-	+0.8	V
Input High Voltage	V_{IH}	-		+2.0	-	V_{DD} +0.5	V
Input Leakage Current	I_{LI}	VIN = V_{SS} to V_{DD}		-10	-	+10	µA
Output Leakage Current	I_{LO}	VI/O = V_{SS} to V_{DD} $\overline{CS1}$ = V_{IH} or CS2 = V_{IL} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IL}		-10	-	+10	µA
Output Low Voltage	V_{OL}	I_{OL} = +8.0 mA		-	-	0.4	V
Output High Voltage	V_{OH}	I_{OH} = -4.0 mA		2.4	-	-	V
Operating Power Supply Current	I_{DD}	$\overline{CS1}$ = V_{IL}, CS2 = V_{IH} I/O = 0 mA Cycle = MIN Duty = 100%	10	-	-	130	mA
			12	-	-	120	mA
			15	-	-	100	mA
Standby Power Supply Current	I_{SB}	$\overline{CS1}$ = V_{IH}, or CS2 = V_{IL}		-	-	15	mA
	I_{SB1}	$\overline{CS1}$ ≥ V_{DD} -0.2V or CS2 ≤ 0.2V		-	-	5	mA

Note: Typical characteristics are at V_{DD} = 3.3V, T_A = 25° C.

CAPACITANCE

(V_{DD} = 3.3V, T_A = 25° C, f = 1 MHz)

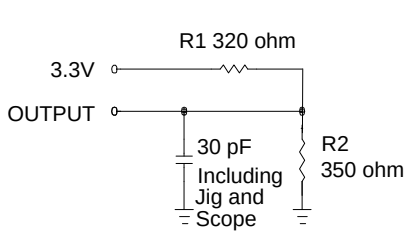
PARAMETER	SYM.	CONDITIONS	MAX.	UNIT
Input Capacitance	C_{IN}	V_{IN} = 0V	8	pF
Input/Output Capacitance	$C_{I/O}$	V_{OUT} = 0V	10	pF

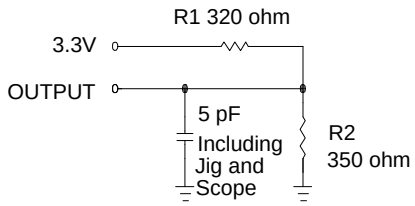
Note: These parameters are sampled but not 100% tested.

AC TEST CONDITIONS

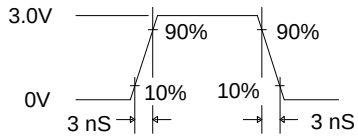
PARAMETER	CONDITIONS
Input Pulse Levels	0V to 3V
Input Rise and Fall Times	3 nS
Input and Output Timing Reference Level	1.5V
Output Load	C_L = 30 pF, I_{OH}/I_{OL} = -4 mA/8 mA

AC TEST LOADS AND WAVEFORM





(For T_{CLZ1}, T_{CLZ2}, T_{OLZ}, T_{CHZ1}, T_{CHZ2}, T_{OHZ}, T_{WHZ}, T_{OW})



AC CHARACTERISTICS

(V_{DD} = 3.3V ±5%, V_{SS} = 0V, T_A = 0 to 70° C for 10/12/15 nS ; -20 to 85° C for 12/15 nS)

Read Cycle

PARAMETER	SYM.	W24L01A-10		W24L01A-12		W24L01A-15		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Read Cycle Time	T_{RC}	10	-	12	-	15	-	nS
Address Access Time	T_{AA}	-	10	-	12	-	15	nS
Chip Select Access Time	T_{ACS}	-	10	-	12	-	15	nS
Output Enable to Output Valid	T_{AOE}	-	5	-	6	-	7	nS
Chip Selection to Output in Low Z	T_{CLZ}*	3	-	3	-	3	-	nS
Output Enable to Output in Low Z	T_{OLZ}*	0	-	0	-	0	-	nS
Chip Deselection to Output in High Z	T_{CHZ}*	-	5	-	6	-	7	nS
Output Disable to Output in High Z	T_{OHZ}*	-	5	-	6	-	7	nS
Output Hold from Address Change	T_{OH}	3	-	3	-	3	-	nS

* These parameters are sampled but not 100% tested.

Write Cycle

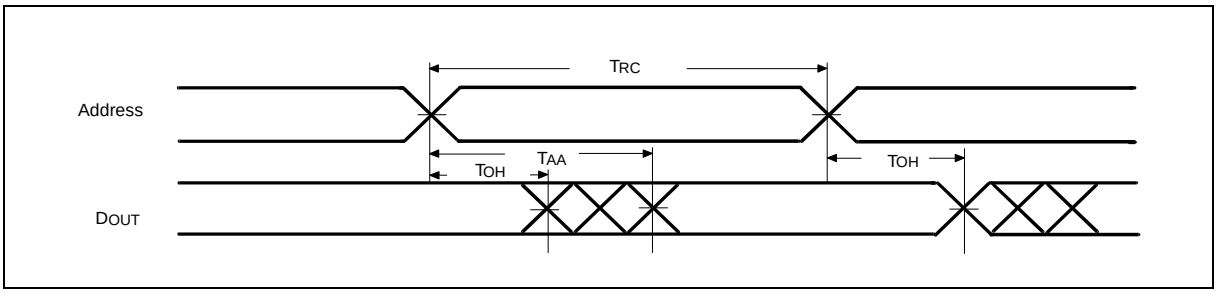
PARAMETER	SYM.	W24L01A-10		W24L01A-12		W24L01A-15		UNIT
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Write Cycle Time	T_{WC}	10	-	12	-	15	-	nS
Chip Selection to End of Write	T_{CW1}	9	-	10	-	13		nS
Address Valid to End of Write	T_{AW}	9	-	10	-	13	-	nS
Address Setup Time	T_{AS}	0	-	0	-	0		nS
Write Pulse Width	T_{WP}	9	-	10	-	10	-	nS
Write Recovery Time ($\overline{CS}$, $\overline{WE}$)	T_{WR}	0	-	0	-	0	-	nS
Data Valid to End of Write	T_{DW}	5	-	7	-	9	-	nS
Data Hold from End of Write	T_{DH}	0	-	0	-	0	-	nS
Write to Output in High Z	T_{WHZ}*	-	5	-	6	-	8	nS
Output Disable to Output in High Z	T_{OHZ}*	-	5	-	6	-	8	nS
Output Active from End of Write	T_{OW}	0	-	0	-	0	-	nS

* These parameters are sampled but not 100% tested.

TIMING WAVEFORMS

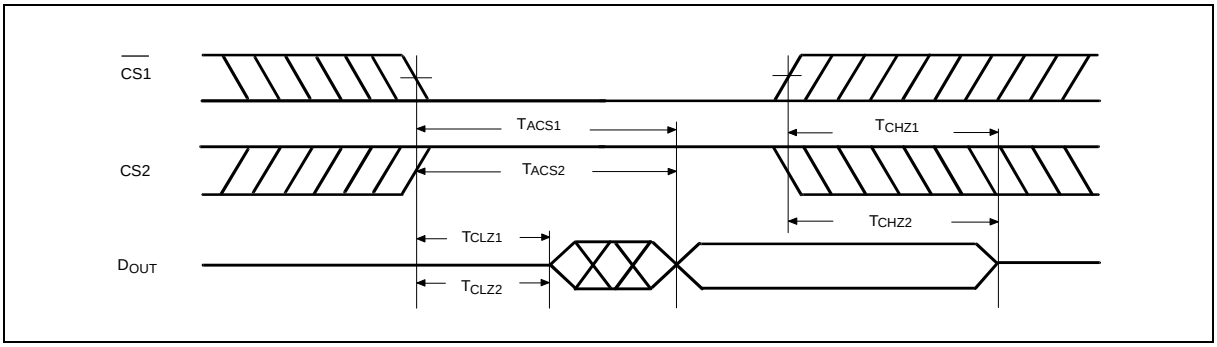
Read Cycle 1

(Address Controlled)



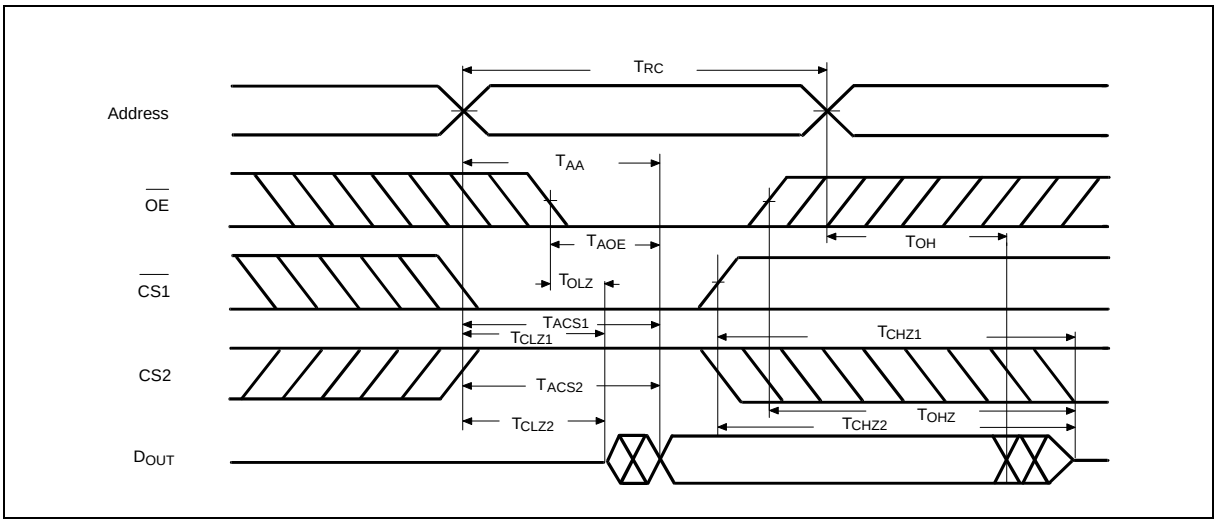
Read Cycle 2

(Chip Select Controlled)



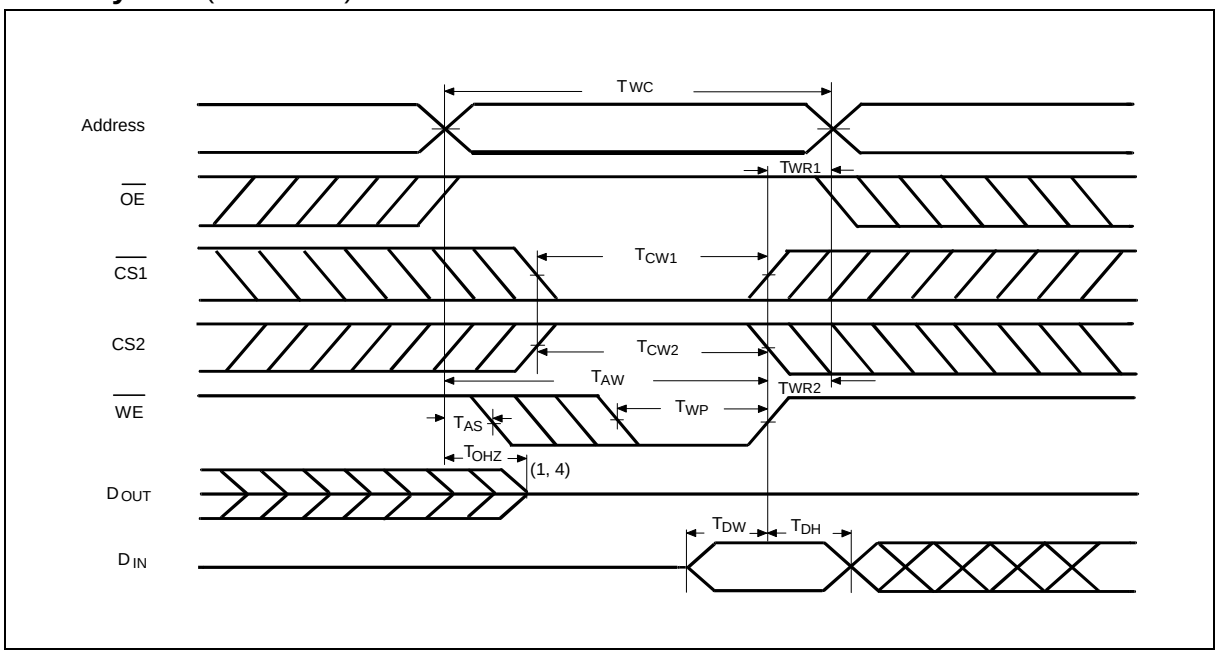
Read Cycle 3

(Output Enable Controlled)

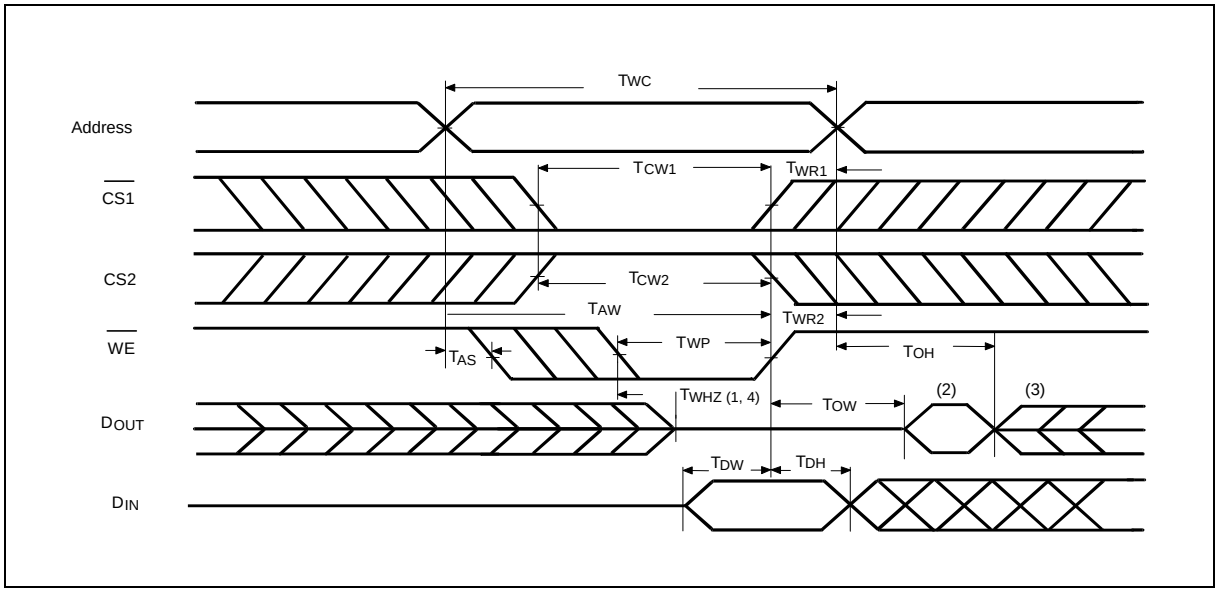


Timing Waveforms, continued

Write Cycle 1 ($\overline{OE}$ Clock)



Write Cycle 2 ($\overline{OE}$ = VIL Fixed)



Notes:

1. During this period, I/O pins are in the output state, so input signals of opposite phase to the outputs should not be applied.
2. The data output from D_{OUT} are the same as the data written to D_{IN} during the write cycle.
3. Dout provides the read data for the next address.
4. Transition is measured ±500 mV from steady state with C_L = 5 pF. This parameter is guaranteed but not 100% tested.

ORDERING INFORMATION

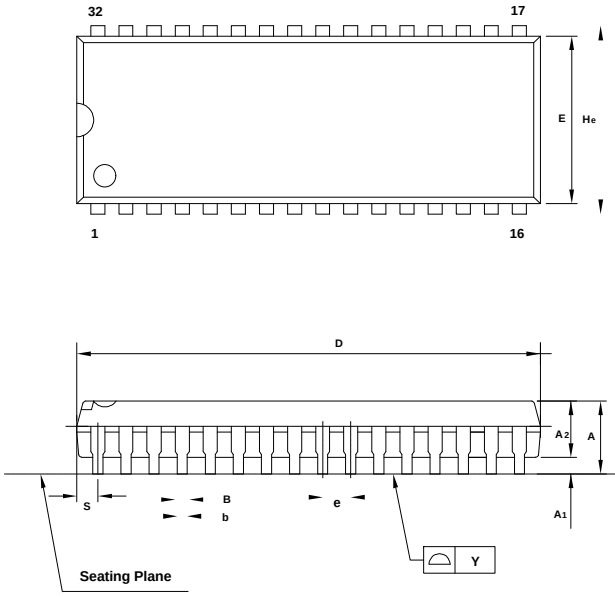
PART NO.	ACCESS TIME (nS)	OPERATING CURRENT Max. (mA)	STANDBY CURRENT Max. (mA)	OPERATION TEMPERATURE (°C)	PACKAGE
W24L01AJ-10	10	130	5	0 to +70	300 mil SOJ
W24L01AJ-12	12	120	5	0 to +70	300 mil SOJ
W24L01AJ-15	15	100	5	0 to +70	300 mil SOJ
W24L01AQ-10	10	130	5	0 to +70	TSOPI (8 x 13.4 mm^2)
W24L01AQ-12	12	120	5	0 to +70	TSOPI (8 x 13.4 mm^2)
W24L01AQ-15	15	100	5	0 to +70	TSOPI(8 x 13.4 mm^2)
W24L01AT-10	10	130	5	0 to +70	TSOPI (8 x 20 mm^2)
W24L01AT-12	12	120	5	0 to +70	TSOPI (8 x 20 mm^2)
W24L01AT-15	15	100	5	0 to +70	TSOPI (8 x 20 mm^2)
W24L01AJ12E	12	120	5	-20 to +85	300 mil SOJ
W24L01AJ15E	15	100	5	-20 to +85	300 mil SOJ
W24L01AQ12E	12	120	5	-20 to +85	TSOPI (8 x 13.4 mm^2)
W24L01AQ15E	15	100	5	-20 to +85	TSOPI (8 x 13.4 mm^2)
W24L01AT12E	12	120	5	-20 to +85	TSOPI (8 x 20 mm^2)
W24L01AT15E	15	100	5	-20 to +85	TSOPI (8 x 20 mm^2)

Notes:

1. Winbond reserves the right to make changes to its products without prior notice.
2. Purchasers are responsible for performing appropriate quality assurance testing on products intended for use in applications where personal injury might occur as a consequence of product failure.

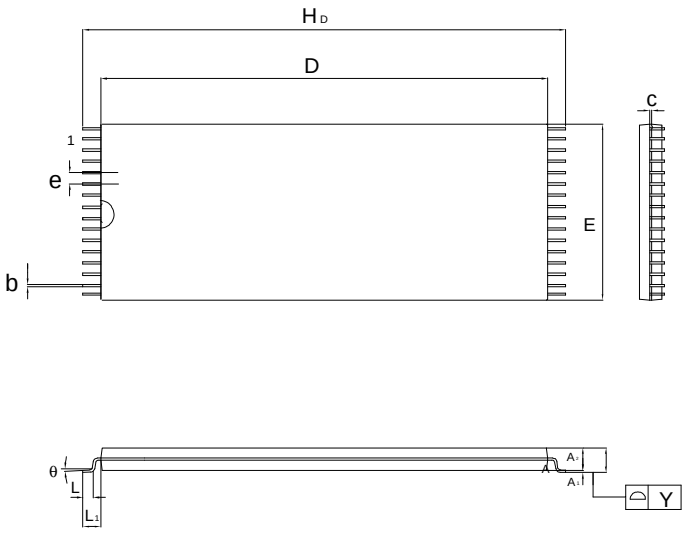
PACKAGE DIMENSIONS

32-pin SOJ



Symbol	Dimension in Inches			Dimension in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	—	—	0.140	—	—	3.556
A_1	0.020	—	—	0.508	—	—
A_2	0.095	0.100	0.105	2.413	2.540	2.667
B	0.026	0.028	0.032	0.660	0.711	0.813
b	0.016	0.018	0.022	0.406	0.457	0.559
c	0.008	0.010	0.014	0.203	0.254	0.356
D	0.815	0.825	0.835	20.701	20.955	21.209
E	0.295	0.300	0.305	7.493	7.620	7.747
e	0.044	0.050	0.056	1.118	1.270	1.422
e_1	0.247	0.267	0.287	6.274	6.782	7.290
H_e	0.325	0.335	0.345	8.255	8.509	8.763
L	0.080	—	—	2.032	—	—
S	—	—	0.045	—	—	1.143
Y	—	—	0.004	—	—	0.102
q	0	—	10	0 °	—	10 °

32-Lead Small Type One TSOP (8 x 13.4)

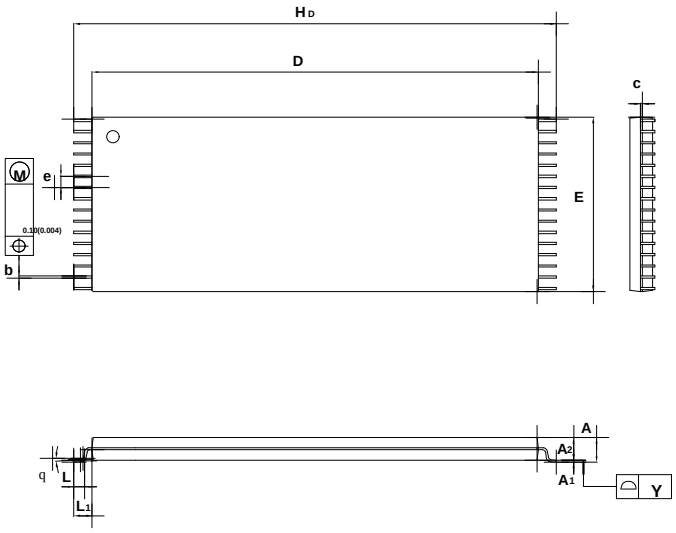


Symbol	Dimension in Inches			Dimension in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	—	—	0.049	—	—	1.25
A_1	0.002	—	0.006	0.05	—	0.15
A_2	0.037	0.039	0.041	0.95	1.00	1.05
b	0.007	0.008	0.009	0.17	0.20	0.27
c	0.0056	0.0059	0.0062	0.14	0.15	0.16
D	0.461	0.465	0.469	11.70	11.80	11.90
E	0.311	0.315	0.319	7.90	8.00	8.10
H_D	0.520	0.528	0.536	13.20	13.40	13.60
e	—	0.020	—	—	0.50	—
L	0.012	0.020	0.028	0.30	0.50	0.70
L_1	0.027	—	—	0.675	—	—
Y	0.000	—	0.004	0.00	—	0.10
θ	0	3	5	0	3	5

Controlling dimension: Millimeters

Package Dimensions, continued

32-pin TSOP



Symbol	Dimension in Inches			Dimension 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	0.041	0.95	1.00	1.05
b	0.007	0.008	0.009	0.17	0.20	0.23
c	0.005	0.006	0.007	0.12	0.15	0.17
D	0.720	0.724	0.728	18.30	18.40	18.50
E	0.311	0.315	0.319	7.90	8.00	8.10
H_D	0.780	0.787	0.795	19.80	20.00	20.20
e	—	0.020	—	—	0.50	—
L	0.016	0.020	0.024	0.40	0.50	0.60
L_1	—	0.031	—	—	0.80	—
Y	0.000	—	0.004	0.00	—	0.10
q	1	3	5	1	3	5

Note:
Controlling dimension: Millimeter

VERSION HISTORY

VERSION	DATE	PAGE	DESCRIPTION
A1	Apr. 26, 2002	-	Initial Issued

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