



Preliminary W24L11

128K × 8 CMOS STATIC RAM

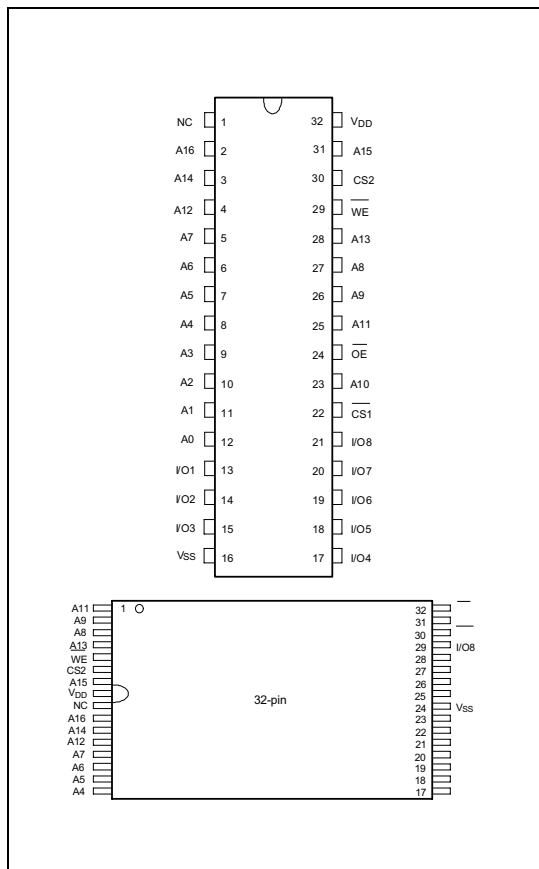
GENERAL DESCRIPTION

The W24L11 is a normal-speed, very low-power CMOS static RAM organized as 131072 × 8 bits that operates on a wide voltage range from 3.0V to 3.6V power supply. This device is manufactured using Winbond's high performance CMOS technology.

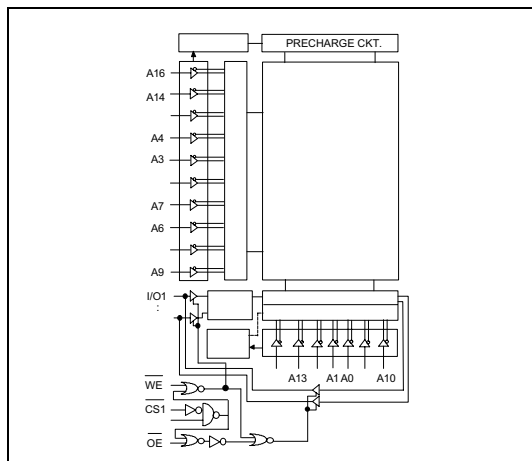
FEATURES

- Low power consumption:
 - Active: 144 mW (max.)
- Access time: 70 nS
- Single 3.3V power supply
- Fully static operation
- All inputs and outputs directly TTL compatible
- Three-state outputs
- Battery back-up operation capability
- Data retention voltage: 2V (min.)
- Packaged in 600 mil DIP, 450 mil SOP, standard type one, TSOP (8 mm × 20 mm) , small type one and TSOP (8 mm × 13.4 mm)

PIN CONFIGURATIONS



BLOCK DIAGRAM



PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0-A16	Address Inputs
I/O1-I/O8	Data Inputs/Outputs
CS1, CS2	Chip Select Input
WE	Write Enable Input
OE	Output Enable Input
VDD	Power Supply
VSS	Ground
NC	No Connection

Preliminary W24L11



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	I _{DD}
L	H	L	H	Read	Data Out	I _{DD}
L	H	X	L	Write	Data In	I _{DD}

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	0 to 70	°C

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

Operating Characteristics

(V_{DD} = 3.0V to 3.6V; V_{SS} = 0V; T_A (°C) = 0 to 70)

PARAMETER	SYM.	TEST CONDITIONS	MIN.	MAX.	UNIT
Input Low Voltage	V _{IL}	-	-0.5	+0.6	V
Input High Voltage	V _{IH}	-	+2.0	V _{DD} +0.5	V
Input Leakage Current	I _{LI}	V _{IN} = V _{SS} to V _{DD}	-1	+1	μA
Output Leakage Current	I _{LO}	V _{I/O} = V _{SS} to V _{DD} , CS1 = V _{IH} (min.) or CS2 = V _{IL} (max.) or OE = V _{IH} (min.) or WE = V _{IL} (max.)	-1	+1	μA
Output Low Voltage	V _{OL}	I _{OL} = +2.1 mA	-	0.4	V
Output High Voltage	V _{OH}	I _{OH} = -1.0 mA	2.2	-	V
Operating Power Supply Current	I _{DD}	CS1 = V _{IL} (max.) and CS2 = V _{IH} (min.), I/O = 0 mA, Cycle = min. Duty = 100%	-	40	mA

Preliminary W24L11



Operating Characteristics, continued

PARAMETER	SYM.	TEST CONDITIONS	MIN.	MAX.	UNIT
Standby Power Supply Current	I _{SB}	$\overline{CS1} = V_{IH} \text{ (min.) or } CS2 = V_{IL} \text{ (max.)}$ Cycle = min. Duty = 100%	-	1	mA
	I _{SB1}	$\overline{CS1} \geq V_{DD} - 0.2V \text{ or } CS2 \leq 0.2V$	LL	50	μA
			L	100	

Note: Typical parameter is measured under ambient temperature $T_A = 25^\circ C$ and $V_{DD} = 3.3V$

CAPACITANCE

($V_{DD} = 3.3V$, $T_A = 25^\circ C$, $f = 1MHz$)

PARAMETER	SYM.	CONDITIONS	MAX.	UNIT
Input Capacitance	C _{IN}	$V_{IN} = 0V$	6	pF
Input/Output Capacitance	C _{I/O}	$V_{OUT} = 0V$	8	pF

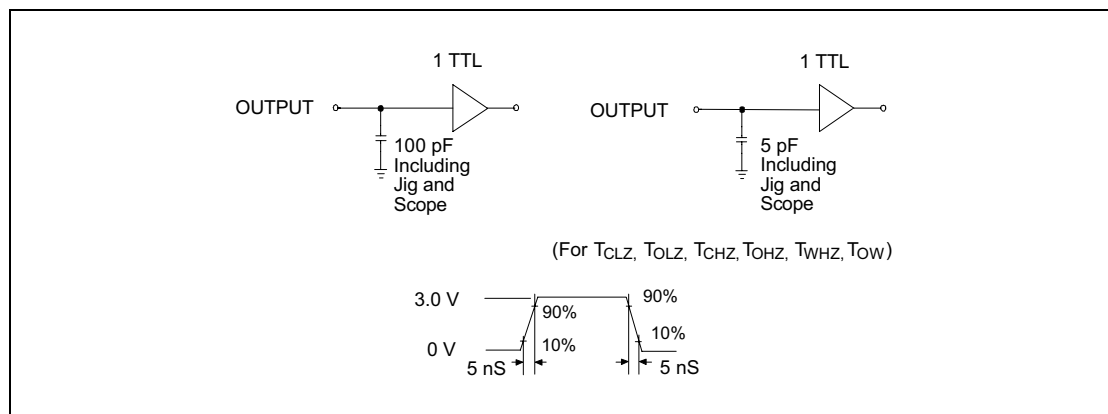
Note: These parameters are sampled but not 100% tested.

AC characteristics

AC Test Conditions

PARAMETER	CONDITIONS
Input Pulse Levels	0V to 3.0V
Input Rise and Fall Times	5 nS
Input and Output Timing Reference Level	1.5V
Output Load	See the drawing below

AC Test Loads and Waveform



Publication Release Date: October 1999

Revision A1

Preliminary W24L11



AC Characteristics, continued

(V_{DD} = 3.0V to 3.6 V; V_{SS} = 0V; T_A (°C) = 0 to 70)

Read Cycle

PARAMETER	SYMBOL	W24L11-70L/LL		UNIT
		MIN.	MAX.	
Read Cycle Time	TRC	70	-	nS
Address Access Time	TAA	-	70	nS
Chip Select Access Time	TACS	-	70	nS
Output Enable to Output Valid	TAOE	-	35	nS
Chip Selection to Output in Low Z	TCLZ*	10	-	nS
Output Enable to Output in Low Z	TOLZ*	5	-	nS
Chip Deselection to Output in High Z	TCHZ*	-	30	nS
Output Disable to Output in High Z	TOHZ*	-	30	nS
Output Hold from Address Change	TOH	10	-	nS

* These parameters are sampled but not 100% tested

Write Cycle

PARAMETER		SYMBOL	W24L11-70L/LL		UNIT
			MIN.	MAX.	
Write Cycle Time		TWC	70	-	nS
Chip Selection to End of Write		TCW	55	-	nS
Address Valid to End of Write		TAW	55	-	nS
Address Setup Time		TAS	0	-	nS
Write Pulse Width		TWP	50	-	nS
Write Recovery Time	$\overline{CS1}$, CS2, $\overline{WE}$	TWR	0	-	nS
Data Valid to End of Write		TDW	45	-	nS
Data Hold from End of Write		TDH	0	-	nS
Write to Output in High Z		TWHZ*	-	25	nS
Output Disable to Output in High Z		TOHZ*	-	25	nS
Output Active from End of Write		TOW	5	-	nS

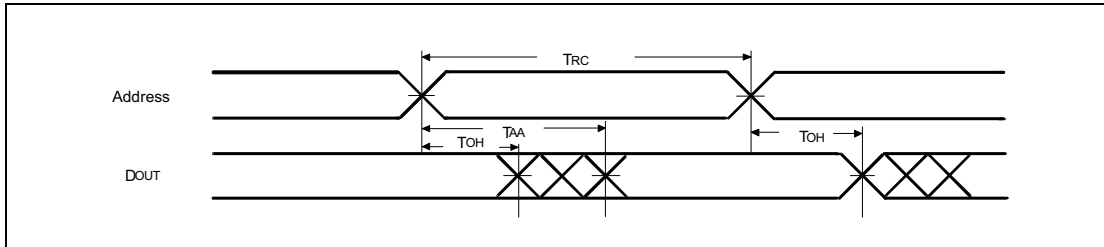
* These parameters are sampled but not 100% tested



TIMING WAVEFORMS

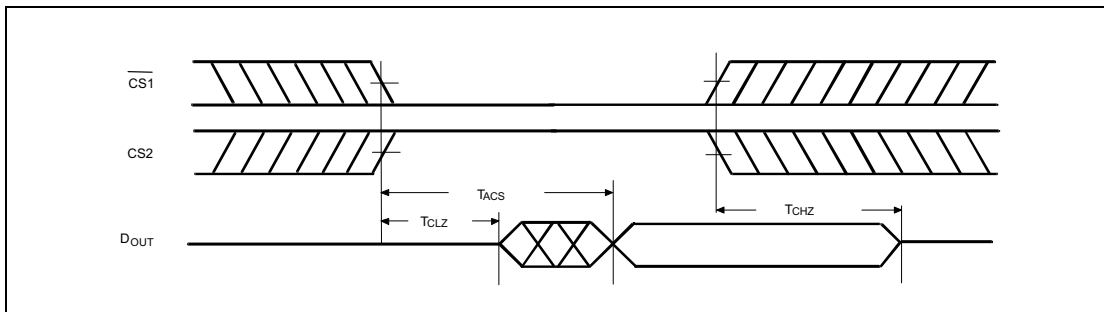
Read Cycle 1

(Address Controlled)



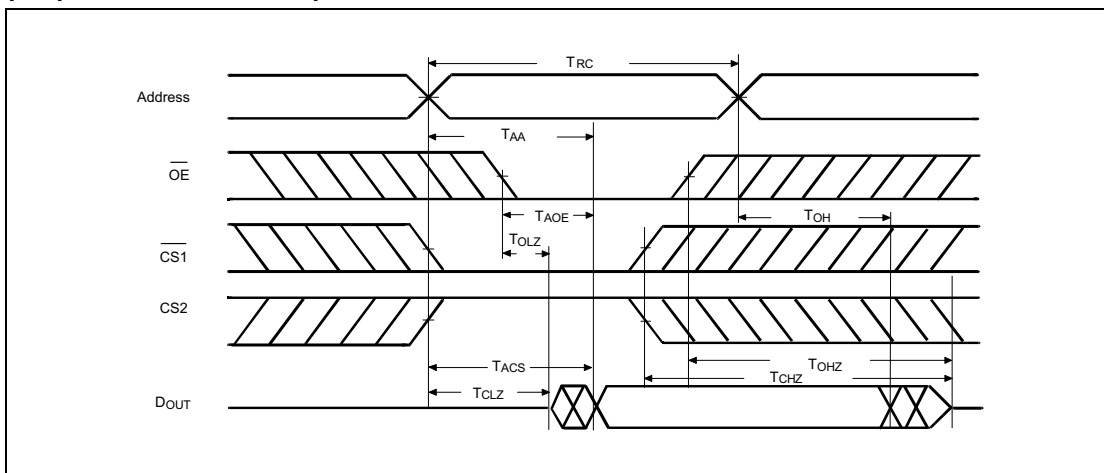
Read Cycle 2

(Chip Select Controlled)



Read Cycle 3

(Output Enable Controlled)

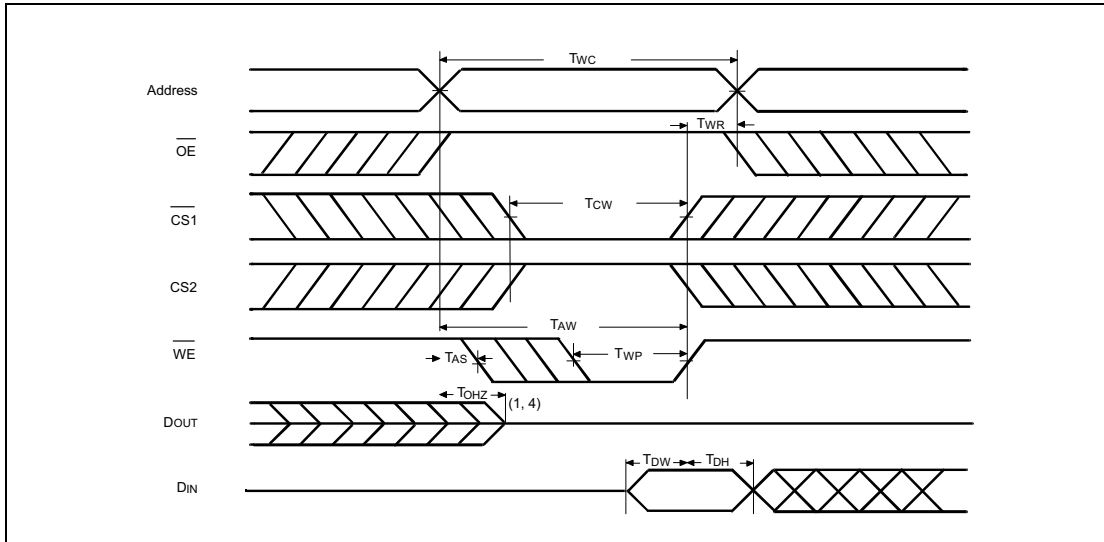


Preliminary W24L11



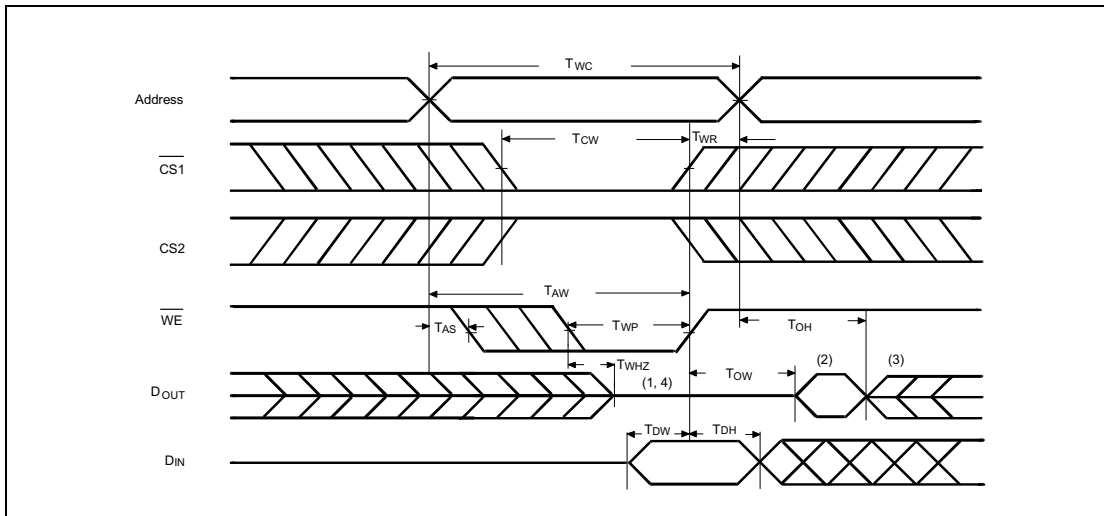
Timing Waveforms, continued

Write Cycle 1



Write Cycle 2

(OE = V_{IL} 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 DOUT are the same as the data written to DIN 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.

Preliminary W24L11



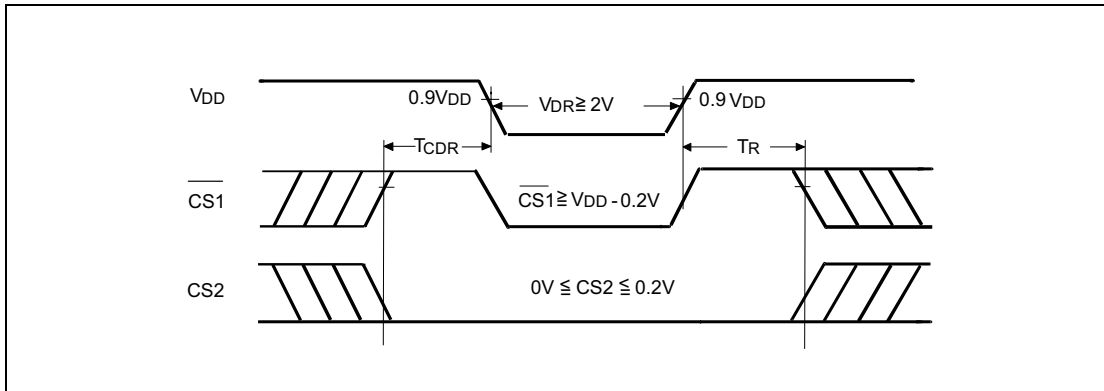
DATA RETENTION CHARACTERISTICS

(T_A (°C) = 0 to 70)

PARAMETER	SYM.	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{DD} for Data Retention	VDR	$\overline{CS1} \geq V_{DD} - 0.2V$ or $CS2 \leq 0.2V$	2.0	-	-	V
Data Retention Current	I _{DDDR}	$\overline{CS1} \geq V_{DD} - 0.2V$ or $CS2 \leq 0.2V$, V _{DD} = 3V	-	-	50	μA
Chip Deselect to Data Retention Time	T _{CDR}	See data retention waveform	0	-	-	nS
Operation Recovery Time	T _R		T _{RC} *	-	-	nS

* Read Cycle Time

DATA RETENTION WAVEFORM



Preliminary W24L11



ORDERING INFORMATION

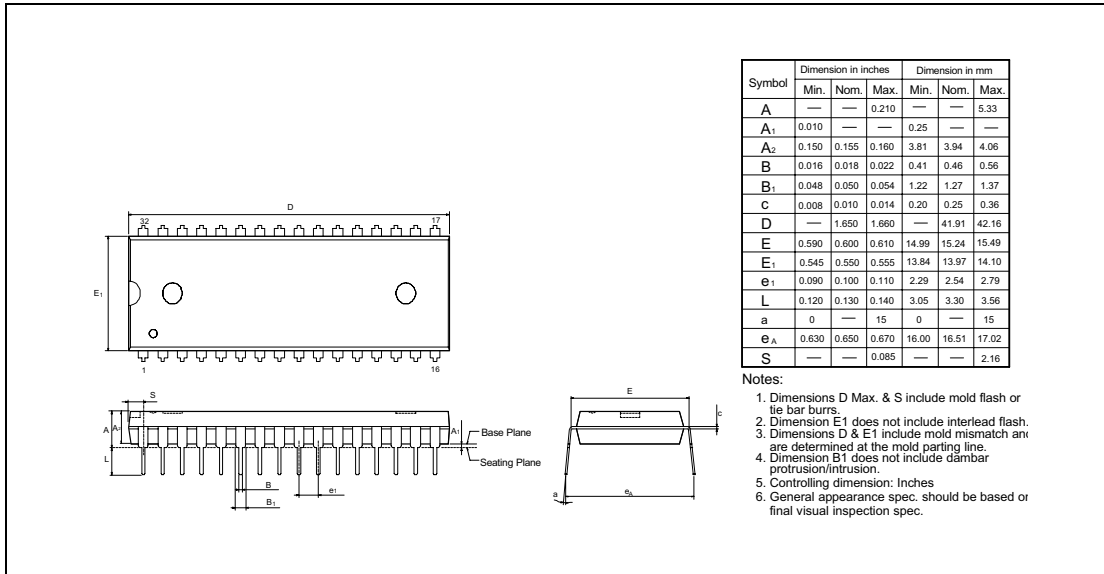
PART NO.	ACCESS TIME (nS)	OPERATING VOLTAGE (V)	OPERATING TEMPERATURE (°C)	STANDBY CURRENT MAX.(μA)	PACKAGE
W24L11-70LL	70	3.0V to 3.6V	0 to 70	50	600 mil DIP
W24L11S-70LL	70	3.0V to 3.6V	0 to 70	50	450 mil SOP
W24L11T-70LL	70	3.0V to 3.6V	0 to 70	50	Standard type one TSOP
W24L11Q-70LL	70	3.0V to 3.6V	0 to 70	50	Small type one TSOP
W24L11-70L	70	3.0V to 3.6V	0 to 70	100	600 mil DIP
W24L11S-70L	70	3.0V to 3.6V	0 to 70	100	450 mil SOP
W24L11T-70L	70	3.0V to 3.6V	0 to 70	100	Standard type one TSOP
W24L11Q-70L	70	3.0V to 3.6V	0 to 70	100	Small type one TSOP

Notes:

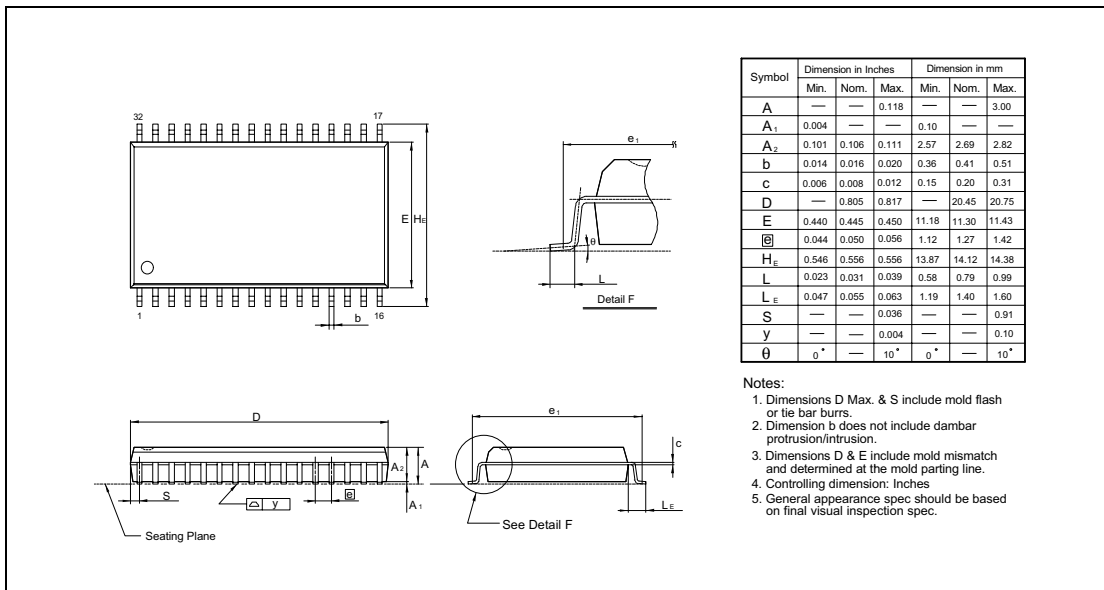
1. Winbond reserves the right to make changes to its products without prior notice.
2. Purchasers are responsible for performing appropriate quality assurance testing on products intended for use in applications where personal injury might occur as a consequence of product failure.

PACKAGE DIMENSIONS

32-pin P-DIP

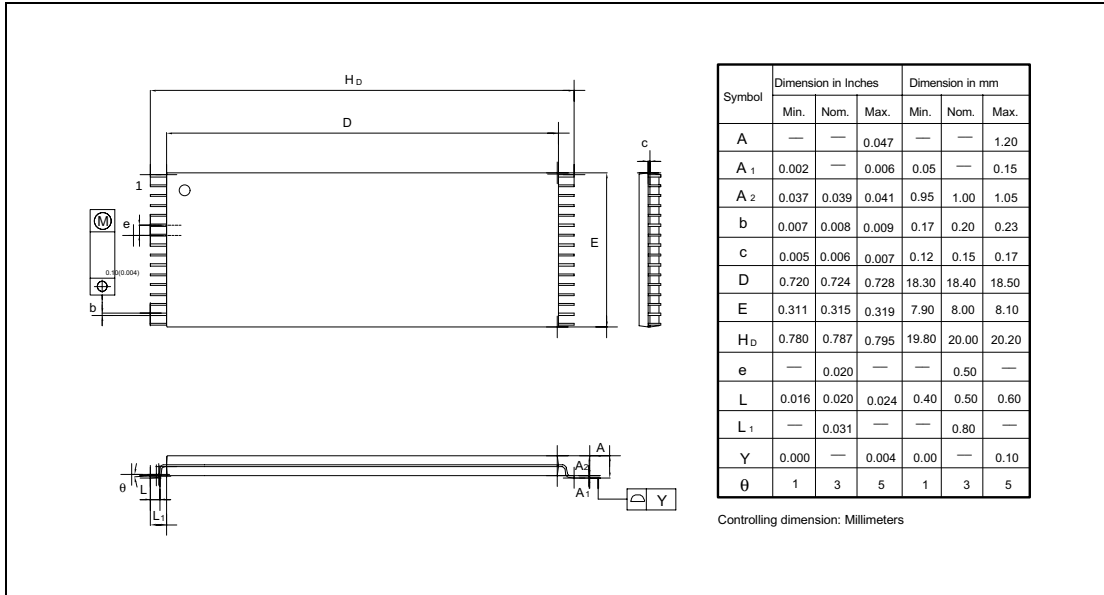


32-pin SOP Wide Body

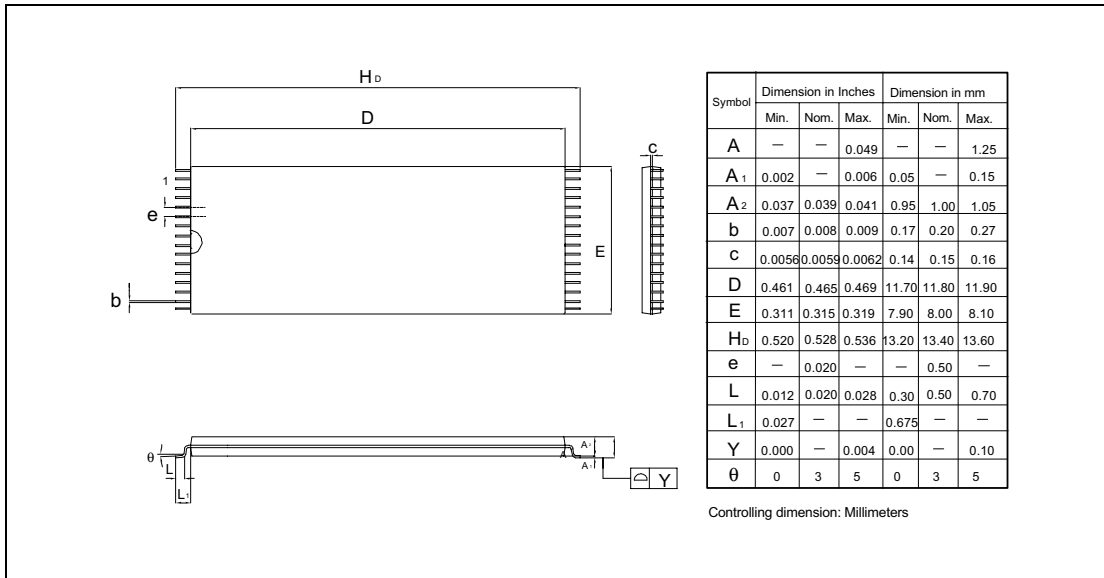


Package Dimensions, continued

32-pin Standard Type One TSOP



32-pin Small Type One TSOP



Preliminary W24L11



VERSION HISTORY

VERSION	DATE	PAGE	DESCRIPTION
A1	Oct. 1999	-	Initial Issued



Headquarters

No. 4, Creation Rd. III,
Science-Based Industrial Park,
Hsinchu, Taiwan
TEL: 886-3-5770066
FAX: 886-3-5796096
<http://www.winbond.com.tw/>
Voice & Fax-on-demand: 886-2-27197006

Taipei Office

11F, No. 115, Sec. 3, Min-Sheng East Rd.,
Taipei, Taiwan
TEL: 886-2-27190505
FAX: 886-2-27197502

Winbond Electronics (H.K.) Ltd.

Rm. 803, World Trade Square, Tower II,
123 Hoi Bun Rd., Kwun Tong,
Kowloon, Hong Kong
TEL: 852-27513100
FAX: 852-27552064

Winbond Electronics North America Corp.

Winbond Memory Lab.
Winbond Microelectronics Corp.
Winbond Systems Lab.

2727 N. First Street, San Jose,
CA 95134, U.S.A.
TEL: 408-9436666
FAX: 408-5441798

Note: All data and specifications are subject to change without notice.

Publication Release Date: October 1999
Revision A1