Winbond Electronics Corp.

256K × 16 HIGH-SPEED CMOS STATIC RAM

GENERAL DESCRIPTION

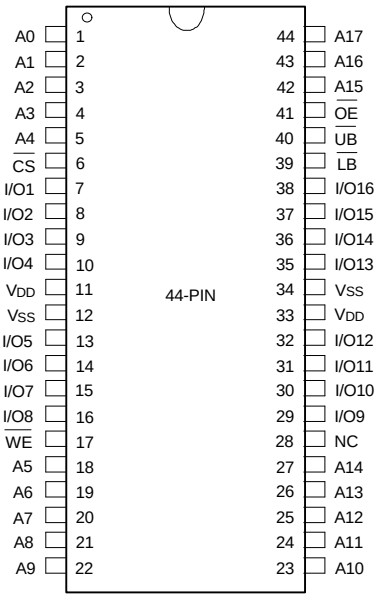
The W26L04A is a high-speed, low-power CMOS static RAM organized as 262,144 × 16 bits that operates on a single 3.3-volt power supply.

The W26L04A has an active low chip select, separate upper and lower byte selects, and a fast output enable. No clock or refreshing is required. Separate byte select controls ($\overline{LB}$ and $\overline{UB}$) allow individual bytes to be written and read. $\overline{LB}$ controls I/O1-I/O8, the lower byte. $\overline{UB}$ controls I/O9–I/O16, the upper byte. This device is well suited for use in high-density, high-speed system applications.

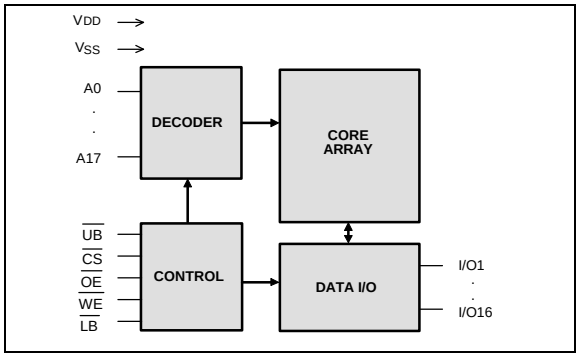
FEATURES

- High speed access time: 10/12 nS (max.)
- Low power consumption:
  - Active: 660 mW (max.)
- Single +3.3V power supply
- Fully static operation
  - No clock or refreshing
- Industrial operating temperature grade available
- All inputs and outputs directly TTL compatible
- Three-state outputs
- Data byte control
  - $\overline{LB}$ (I/O1–I/O8), $\overline{UB}$ (I/O9–I/O16)
- Available packages: 44-pin 400 mil SOJ and 44-pin TSOP(II)

PIN CONFIGURATION



BLOCK DIAGRAM



PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0–A17	Address Inputs
I/O1–I/O16	Data Inputs/Outputs
$\overline{CS}$	Chip Select Input
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
$\overline{LB}$	Lower Byte Select I/O1–I/O8
$\overline{UB}$	Upper Byte Select I/O9–I/O16
VDD	Power Supply
VSS	Ground
NC	No Connection

TRUTH TABLE

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	$\overline{LB}$	$\overline{UB}$	MODE	I/O1- I/O8	I/O9- I/O16	V_{DD} CURRENT
H	X	X	X	X	Not Selected	High Z	High Z	I_{SB}, I_{SB1}
L	H	H	X	X	Output Disable	High Z	High Z	I_{DD}
L	L	H	L	L	2 Bytes Read	D_{OUT}	D_{OUT}	I_{DD}
L	L	H	L	H	Lower Byte Read	D_{OUT}	High Z	I_{DD}
L	L	H	H	L	Upper Byte Read	High Z	D_{OUT}	I_{DD}
L	X	L	L	L	2 Bytes Write	D_{IN}	D_{IN}	I_{DD}
L	X	L	L	H	Lower Byte Write	D_{IN}	High Z	I_{DD}
L	X	L	H	L	Upper Byte Write	High Z	D_{IN}	I_{DD}
L	X	X	H	H	Output Disable	High Z	High Z	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		1.5	W
Storage Temperature		-65 to +150	°C
Operating Temperature	Commercial	0 to +70	°C
	Industrial	-40 to +85	°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} = 3.3V ±5%, V_{SS} = 0V, T_A = -40 to 85° C for Industrial Grade, T_A = 0 to 70° C for Commercial Grade)

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} +0.3	V
Input Leakage Current	I_{LI}	V_{IN} = V_{SS} to V_{DD}	-10	-	+10	µA
Output Leakage Current	I_{LO}	$V_{I/O}$ = V_{SS} to V_{DD} Output Pins in High Z, See Truth Table	-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 Characteristics, continued

PARAMETER	SYM.	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT
Operating Power Supply Current	IDD	$\overline{CS}$ = VIL (max.), Cycle = min. I/O = Open, Duty = 100%	10 nS	Commercial	-	-	200	mA
				Industrial			260	
			12 nS	Commercial	-	-	190	mA
				Industrial			250	
Standby Power Supply Current	ISB	$\overline{CS}$ = VIH (min.), Cycle = min.			-	-	30	mA
	ISB1	$\overline{CS}$ = VDD -0.2V, I/O = open All other pins = VDD -0.2V/GND			-	-	10	mA

Note: Typical characteristics are evaluated 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	6	pF
Input/Output Capacitance	$C_{I/O}$	V_{OUT} = 0V	8	pF

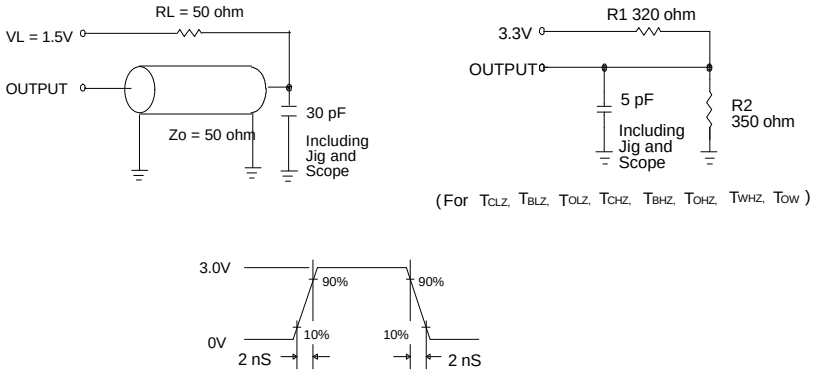
Note: These parameters are sampled but not 100% tested.

AC CHARACTERISTICS

AC Test Conditions

PARAMETER	CONDITIONS
Input Pulse Levels	0V to 3V
Input Rise and Fall Times	2 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



AC Characteristics, continued

(V_{DD} = 3.3V ±5%, V_{SS} = 0V, T_A = -40 to +85° C for Industrial Grade, T_A = 0 to 70° C for Commercial Grade)

Read Cycle

PARAMETER	SYM.	W26L04A-10		W26L04A-12		UNIT
		MIN.	MAX.	MIN.	MAX.	
Read Cycle Time	T_{RC}	10	-	12	-	nS
Address Access Time	T_{AA}	–	10	–	12	nS
Chip Select Access Time	T_{ACS}	–	10	–	12	nS
Output Enable to Output Valid	T_{OE}	–	5	–	6	nS
$\overline{UB}$, $\overline{LB}$ Access Time	T_{BA}	–	5	–	6	nS
Output Hold from Address Change	T_{OH}	3	–	3	–	nS
Chip Select to Output in Low Z	T_{CLZ}*	3	–	3	–	nS
Chip Deselect to Output in High Z	T_{CHZ}*	–	5	–	6	nS
Output Enable to Output in Low Z	T_{OLZ}*	0	–	0	–	nS
Output Disable to Output in High Z	T_{OHZ}*	–	5	–	6	nS
$\overline{UB}$, $\overline{LB}$ Select to Output in Low Z	T_{BLZ}*	0	–	0	–	nS
$\overline{UB}$, $\overline{LB}$ Deselect to Output in High Z	T_{BHZ}*	–	5	–	6	nS

* These parameters are sampled but not 100% tested.

Write Cycle

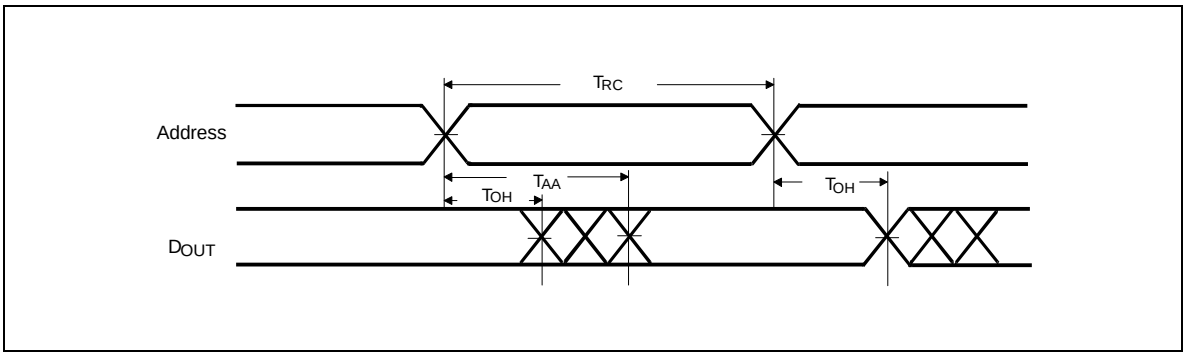
PARAMETER	SYM.	W26L04A-10		W26L04A-12		UNIT
		MIN.	MAX.	MIN.	MAX.	
Write Cycle Time	T_{WC}	10	–	12	–	nS
Chip Select to End of Write	T_{CW}	9	–	10	–	nS
Address Valid to End of Write	T_{AW}	9	–	10	–	nS
Address Setup Time	T_{AS}	0	–	0	–	nS
$\overline{UB}$, $\overline{LB}$ Select to End of Write	T_{BW}	9	–	10	–	nS
Write Pulse Width	T_{WP}	9	–	10	–	nS
Write Recovery Time ($\overline{CS}$, $\overline{WE}$)	T_{WR}	0	–	0	–	nS
Data Valid to End of Write	T_{DW}	6	–	7	–	nS
Data Hold from End of Write	T_{DH}	0	–	0	–	nS
Write to Output in High Z	T_{WHZ}*	–	6	–	7	nS
End of Write to Output Active	T_{OW}*	3	–	3	–	nS

* These parameters are sampled but not 100% tested.

TIMING WAVEFORMS

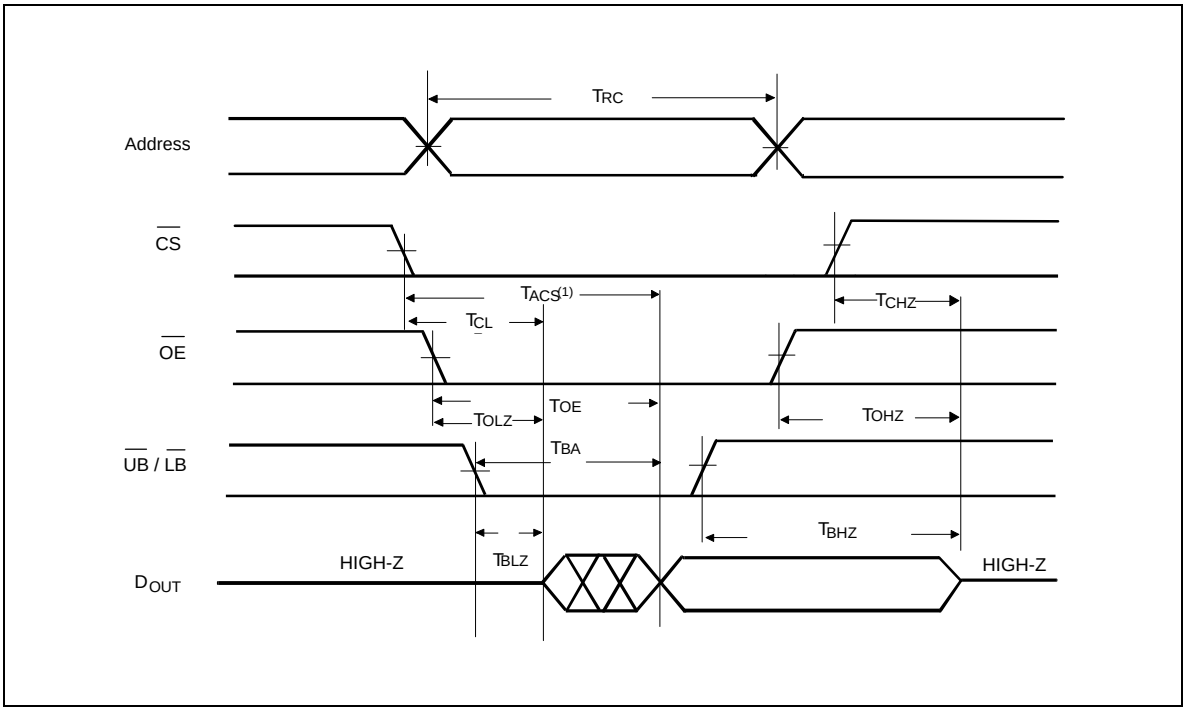
Read Cycle 1

(Address Controlled, $\overline{CS}$ = $\overline{OE}$ = $\overline{UB}$ = $\overline{LB}$ = VIL, $\overline{WE}$ = VIH)



Read Cycle 2

(Chip Select Controlled, $\overline{WE}$ = VIH)

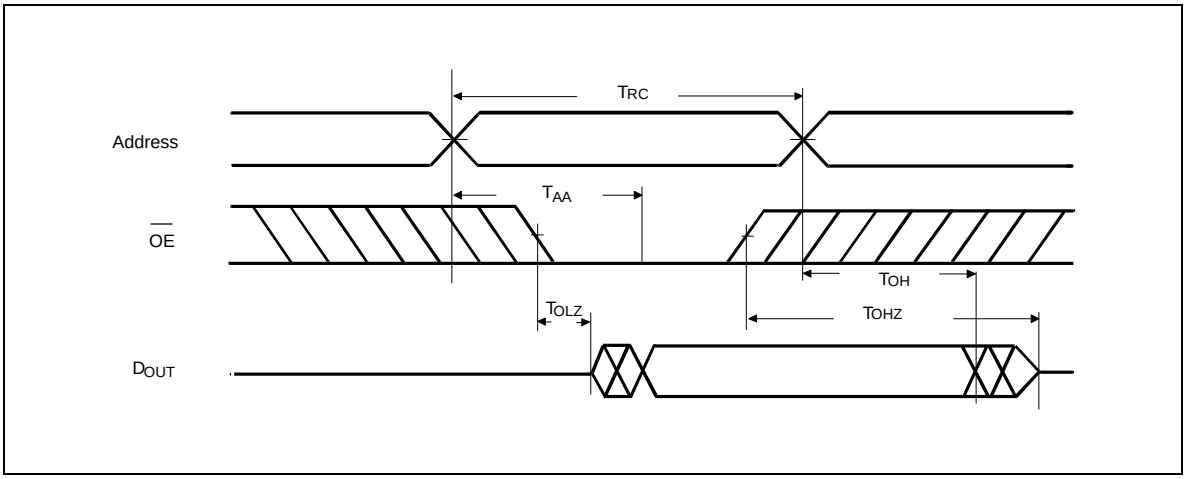


Note (1) : Address valid prior to or coincident with $\overline{CS}$ transition low.

Timing Waveforms, continued

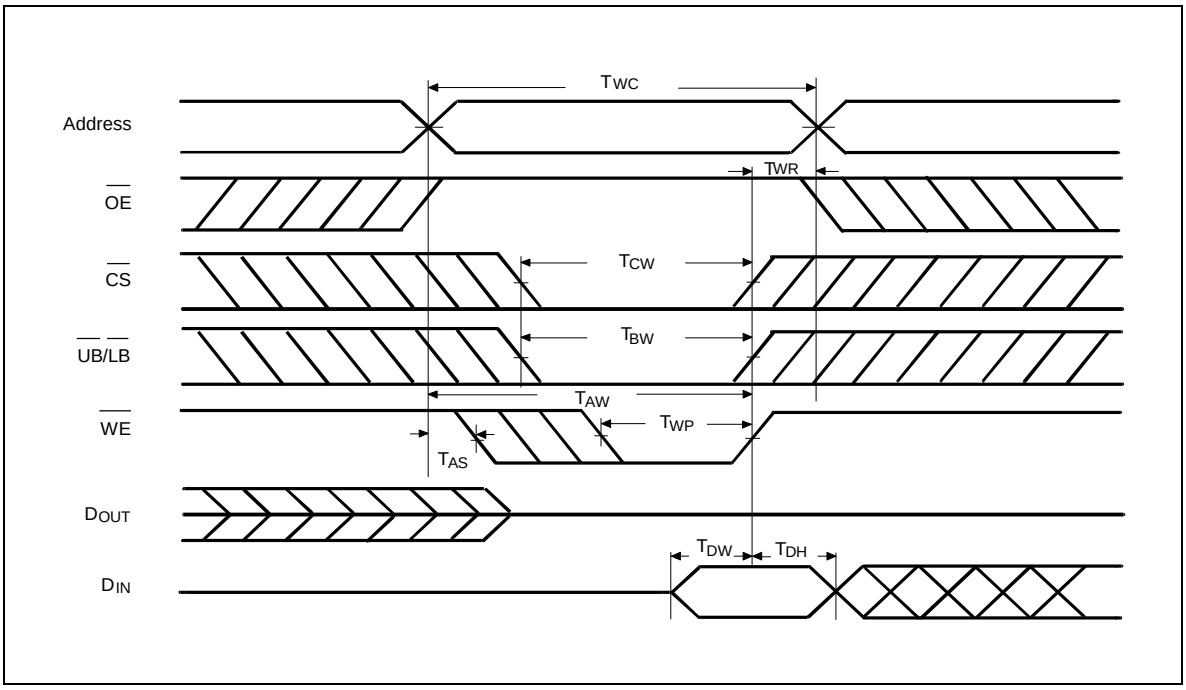
Read Cycle 3

(Output Enable Controlled, $\overline{CS}$ = $\overline{UB}$ = $\overline{LB}$ = VIL, $\overline{WE}$ = VIH)



Write Cycle 1

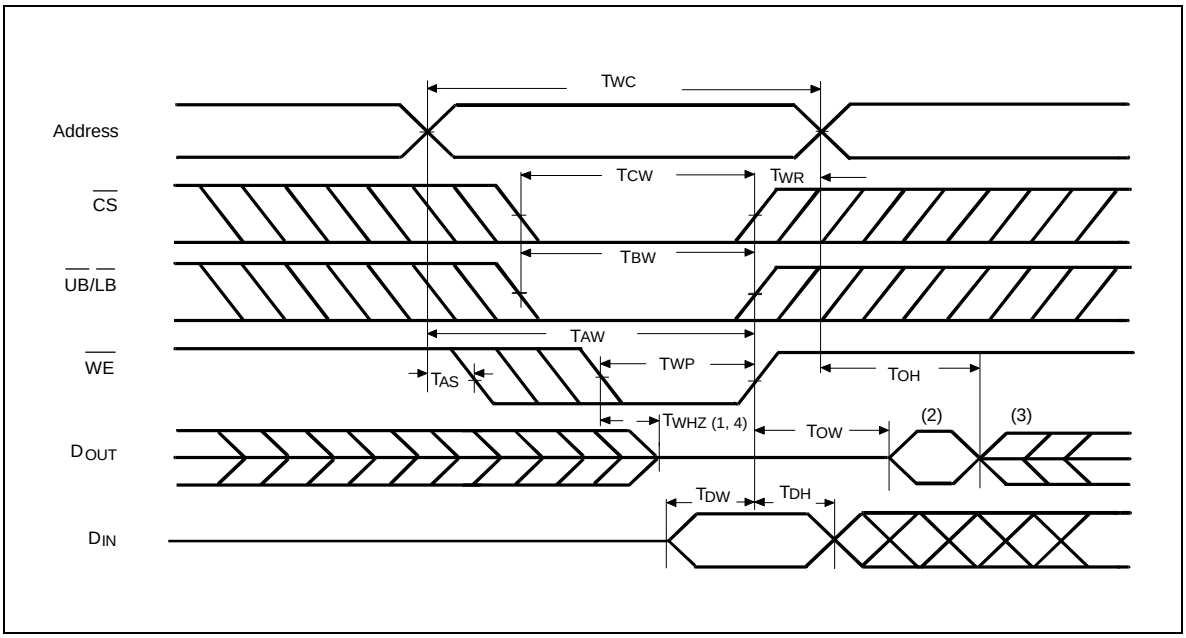
($\overline{OE}$ Clock)



Timing Waveforms, continued

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 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 CL = 5 pF. This parameter is guaranteed but not 100% tested.

ORDERING INFORMATION

Commercial: 0° C to +70° C

PART NO.	ACCESS TIME (nS)	OPERATING CURRENT MAX. (mA)	STANDBY CURRENT MAX. (mA)	PACKAGE
W26L04AJ-10	10	200	10	44-pin 400 mil SOJ
W26L04AJ-12	12	190	10	44-pin 400 mil SOJ
W26L04AH-10	10	200	10	44-pin TSOP(II)
W26L04AH-12	12	190	10	44-pin TSOP(II)

Industrial: -40° C to +85° C

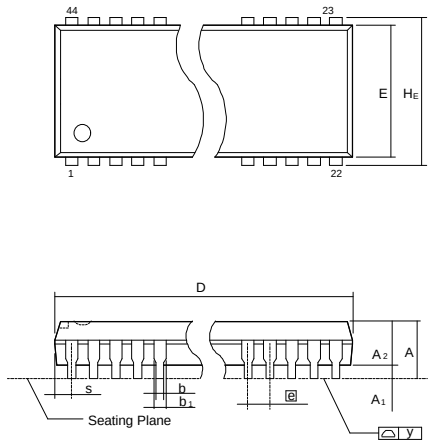
PART NO.	ACCESS TIME (nS)	OPERATING CURRENT MAX. (mA)	STANDBY CURRENT MAX. (mA)	PACKAGE
W26L04AJ-10I	10	260	10	44-pin 400 mil SOJ
W26L04AJ-12I	12	250	10	44-pin 400 mil SOJ
W26L04AH-10I	10	260	10	44-pin TSOP(II)
W26L04AH-12I	12	250	10	44-pin TSOP(II)

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.

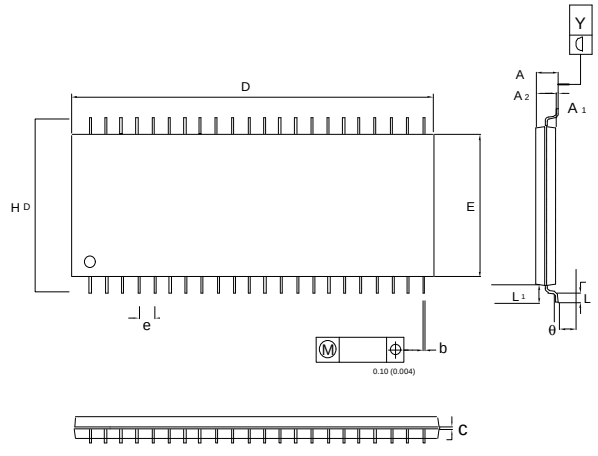
PACKAGE DIMENSIONS

44-pin Small Outline J Band



Symbol	Dimension in inches			Dimension in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.128	0.138	0.148	3.251	3.585	3.759
A_1	0.025	—	—	0.635	—	—
A_2	0.105	0.110	0.115	2.41	2.54	2.67
b_1	0.026	0.028	0.032	0.66	0.711	0.813
b	0.015	—	0.020	0.381	—	0.508
c	0.007	—	0.013	0.178	—	0.330
D	1.120	1.125	1.130	28.45	28.58	28.70
E	0.395	0.400	0.405	10.03	10.16	10.29
e	0.044	0.050	0.056	1.12	1.27	1.42
e_1	—	0.37	—	—	9.40	—
H_E	0.435	0.440	0.445	11.05	11.18	11.30
L	0.082	—	—	2.06	—	—
S	—	—	0.045	—	—	1.14
y	—	—	0.004	—	—	0.10
θ	0°	—	10°	0°	—	10°

44-pin Standard Type Two TSOP



Symbol	Dimension in inches			Dimension in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	—	—	0.047	—	—	1.20
A_1	0.002	—	—	0.05	—	—
A_2	0.037	0.039	0.041	0.95	1.00	1.05
b	0.010	0.014	0.018	0.25	0.35	0.45
c	0.005	0.006	0.007	0.12	0.15	0.17
D	0.721	0.725	0.729	18.31	18.41	18.51
E	0.396	0.400	0.404	10.06	10.16	10.26
H_D	0.455	0.463	0.471	11.56	11.76	11.96
e	—	0.031	—	—	0.80	—
L	0.016	0.020	0.024	0.40	0.50	0.60
L_1	—	0.031	—	—	0.80	—
Y	—	—	0.004	—	—	0.10
θ	0°	—	5°	0°	—	5°

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