



W24258/LL

## 32K × 8 CMOS STATIC RAM

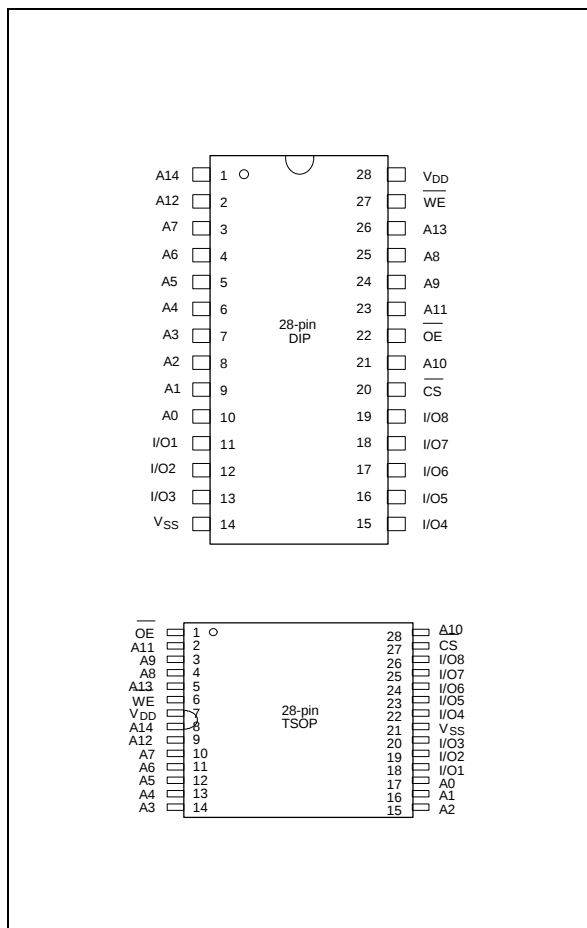
### GENERAL DESCRIPTION

The W24258/LL is a normal speed, very low power CMOS static RAM organized as 32768 × 8 bits that operates on a single 5-volt power supply. This device is manufactured using Winbond's high performance CMOS technology.

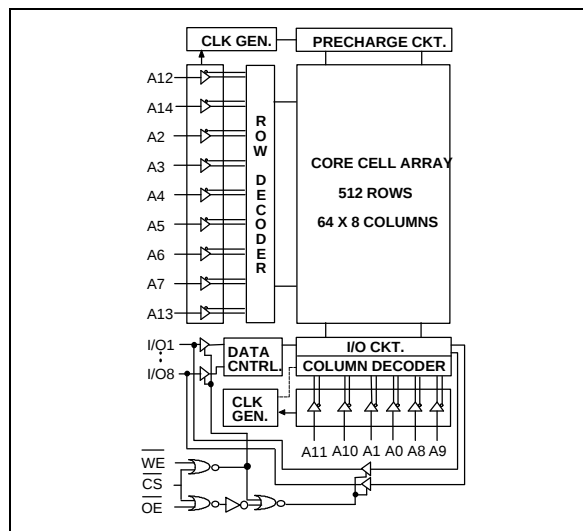
### FEATURES

- Low power consumption:
  - Active: 350 mW (max.)
  - Standby: 25  $\mu$ W (max.)
- Access time: 55/70 nS (max.)
- Single 5V 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 28-pin 600 mil DIP, 330 mil SOP and standard type one TSOP (8 mm × 13.4 mm)

### PIN CONFIGURATIONS



### BLOCK DIAGRAM



### PIN DESCRIPTION

| SYMBOL          | DESCRIPTION         |
|-----------------|---------------------|
| A0–A14          | Address Inputs      |
| I/O1–I/O8       | Data Inputs/Outputs |
| $\overline{CS}$ | Chip Select Input   |
| $\overline{WE}$ | Write Enable Input  |
| $\overline{OE}$ | Output Enable Input |
| V <sub>DD</sub> | Power Supply        |
| V <sub>SS</sub> | Ground              |

## TRUTH TABLE

| CS | OE | WE | MODE           | I/O1- I/O8 | VDD CURRENT |
|----|----|----|----------------|------------|-------------|
| H  | X  | X  | Not Selected   | High Z     | ISB, ISB1   |
| L  | H  | H  | Output Disable | High Z     | IDD         |
| L  | L  | H  | Read           | Data Out   | IDD         |
| L  | X  | L  | Write          | Data In    | IDD         |

## DC CHARACTERISTICS

### Absolute Maximum Ratings

| PARAMETER                       | RATING           | UNIT |
|---------------------------------|------------------|------|
| Supply Voltage to VSS Potential | -0.5 to +7.0     | V    |
| Input/Output to VSS Potential   | -0.5 to VDD +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

(VDD = 5V ±10%; VSS = 0V; TA = 0° C to 70° C)

| PARAMETER                      | SYM. | TEST CONDITIONS                                                                      | MIN. | TYP.* | MAX.     | UNIT |
|--------------------------------|------|--------------------------------------------------------------------------------------|------|-------|----------|------|
| Input Low Voltage              | VIL  | -                                                                                    | -0.5 | -     | +0.8     | V    |
| Input High Voltage             | VIH  | -                                                                                    | +2.2 | -     | VDD +0.5 | V    |
| Input Leakage Current          | ILI  | VIN = VSS to VDD                                                                     | -1   | -     | +1       | μA   |
| Output Leakage Current         | ILO  | V <sub>I/O</sub> = VSS to VDD, CS = VIH (min.) or OE = VIH (min.) or WE = VIL (max.) | -1   | -     | +1       | μA   |
| Output Low Voltage             | VOL  | IOL = +2.1 mA                                                                        | -    | -     | 0.4      | V    |
| Output High Voltage            | VOH  | IOH = -1.0 mA                                                                        | 2.4  | -     | -        | V    |
| Operating Power Supply Current | IDD  | CS = VIL (max.), I/O = 0                                                             | 55   | -     | 70       | mA   |
|                                |      | I/O = 0 mA, Cycle = min. Duty = 100%                                                 | 70   | -     | 60       | mA   |
| Standby Power Supply Current   | ISB  | CS = VIH (min.), Cycle = min. Duty = 100%                                            | -    | -     | 3        | mA   |
|                                | ISB1 | CS ≥ VDD -0.2V                                                                       | -    | 0.7   | 5        | μA   |

Note : Typical parameter is measured under ambient temperature TA = 25° C and VDD = 5V.

## CAPACITANCE

(V<sub>DD</sub> = 5V, T<sub>A</sub> = 25° C, f = 1 MHz)

| PARAMETER                | SYM.             | CONDITIONS            | MAX. | UNIT |
|--------------------------|------------------|-----------------------|------|------|
| Input Capacitance        | C <sub>IN</sub>  | V <sub>IN</sub> = 0V  | 6    | pF   |
| Input/Output Capacitance | C <sub>I/O</sub> | V <sub>OUT</sub> = 0V | 8    | pF   |

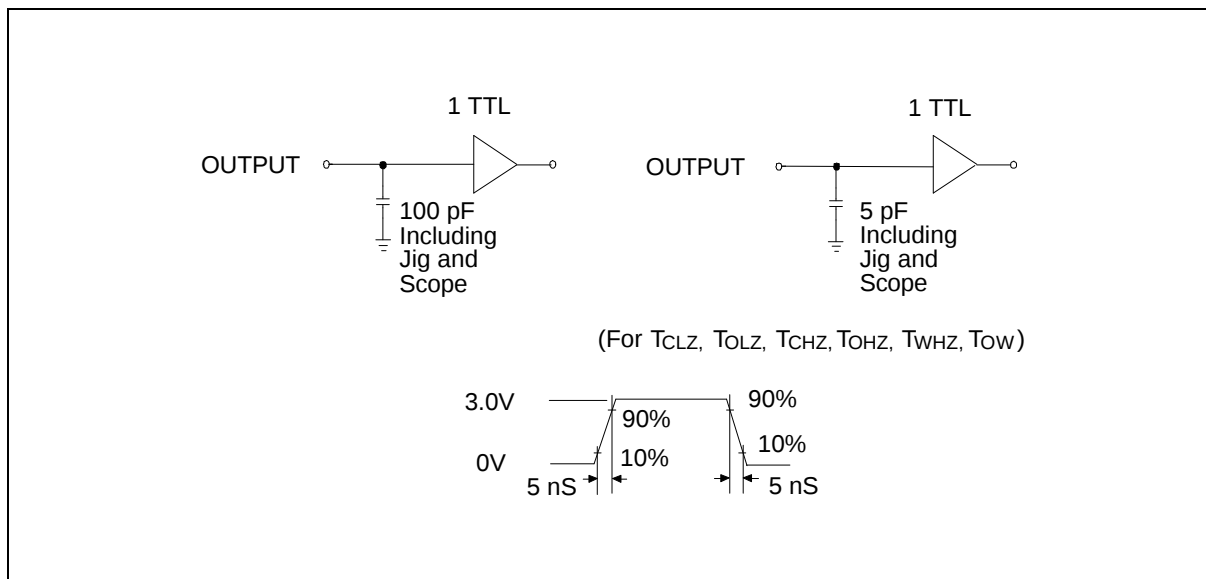
Note: These parameters are sampled but not 100% tested.

## 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



AC Characteristics, continued

(V<sub>DD</sub> = 5V ±10%; V<sub>SS</sub> = 0V; T<sub>A</sub> = 0° C to 70° C)

## Read Cycle

| PARAMETER                            | SYM.  | W24258-55LL |      | W24258-70LL |      | UNIT |
|--------------------------------------|-------|-------------|------|-------------|------|------|
|                                      |       | MIN.        | MAX. | MIN.        | MAX. |      |
| Read Cycle Time                      | TRC   | 55          | -    | 70          | -    | nS   |
| Address Access Time                  | TAA   | -           | 55   | -           | 70   | nS   |
| Chip Select Access Time              | TACS  | -           | 55   | -           | 70   | nS   |
| Output Enable to Output Valid        | TAOE  | -           | 27   | -           | 35   | nS   |
| Chip Selection to Output in Low Z    | TCLZ* | 10          | -    | 10          | -    | nS   |
| Output Enable to Output in Low Z     | TOLZ* | 5           | -    | 5           | -    | nS   |
| Chip Deselection to Output in High Z | TCHZ* | -           | 25   | -           | 30   | nS   |
| Output Disable to Output in High Z   | TOHZ* | -           | 25   | -           | 30   | nS   |
| Output Hold from Address Change      | TOH   | 10          | -    | 10          | -    | nS   |

\* These parameters are sampled but not 100% tested

## Write Cycle

| PARAMETER                          |                                              | SYM.  | W24258-55LL |      | W24258-70LL |      | UNIT |
|------------------------------------|----------------------------------------------|-------|-------------|------|-------------|------|------|
|                                    |                                              |       | MIN.        | MAX. | MIN.        | MAX. |      |
| Write Cycle Time                   |                                              | TWC   | 55          | -    | 70          | -    | nS   |
| Chip Selection to End of Write     |                                              | TCW   | 40          | -    | 50          | -    | nS   |
| Address Valid to End of Write      |                                              | TAW   | 40          | -    | 50          | -    | nS   |
| Address Setup Time                 |                                              | TAS   | 0           | -    | 0           | -    | nS   |
| Write Pulse Width                  |                                              | TWP   | 40          | -    | 50          | -    | nS   |
| Write Recovery Time                | $\overline{\text{CS}}, \overline{\text{WE}}$ | TWR   | 0           | -    | 0           | -    | nS   |
| Data Valid to End of Write         |                                              | TDW   | 25          | -    | 30          | -    | nS   |
| Data Hold from End of Write        |                                              | TDH   | 0           | -    | 0           | -    | nS   |
| Write to Output in High Z          |                                              | TWHZ* | -           | 20   | -           | 25   | nS   |
| Output Disable to Output in High Z |                                              | TOHZ* | -           | 20   | -           | 25   | nS   |
| Output Active from End of Write    |                                              | TOW   | 5           | -    | 5           | -    | nS   |

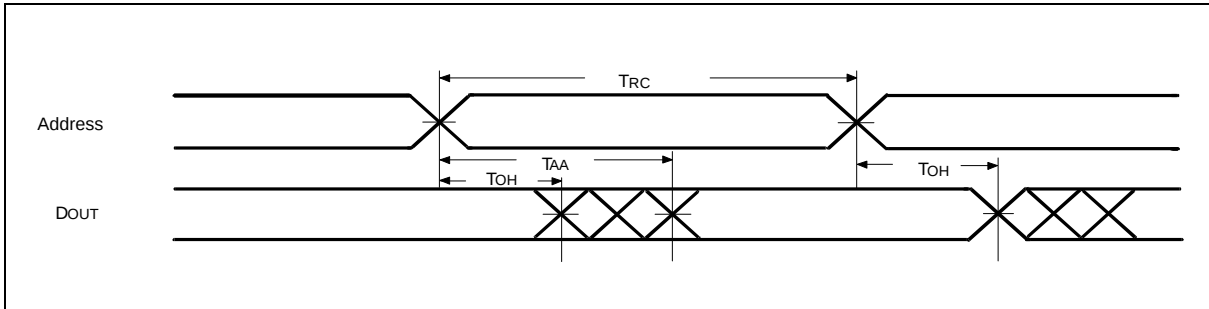
\* These parameters are sampled but not 100% tested



## TIMING WAVEFORMS

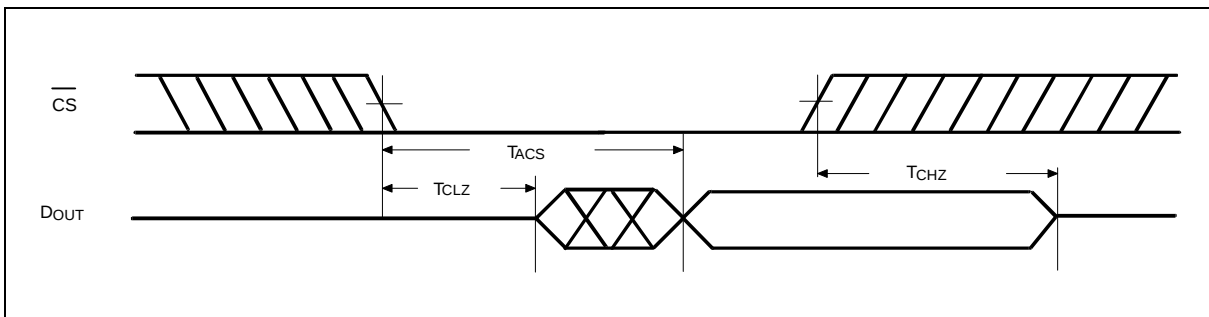
### Read Cycle 1

(Address Controlled)



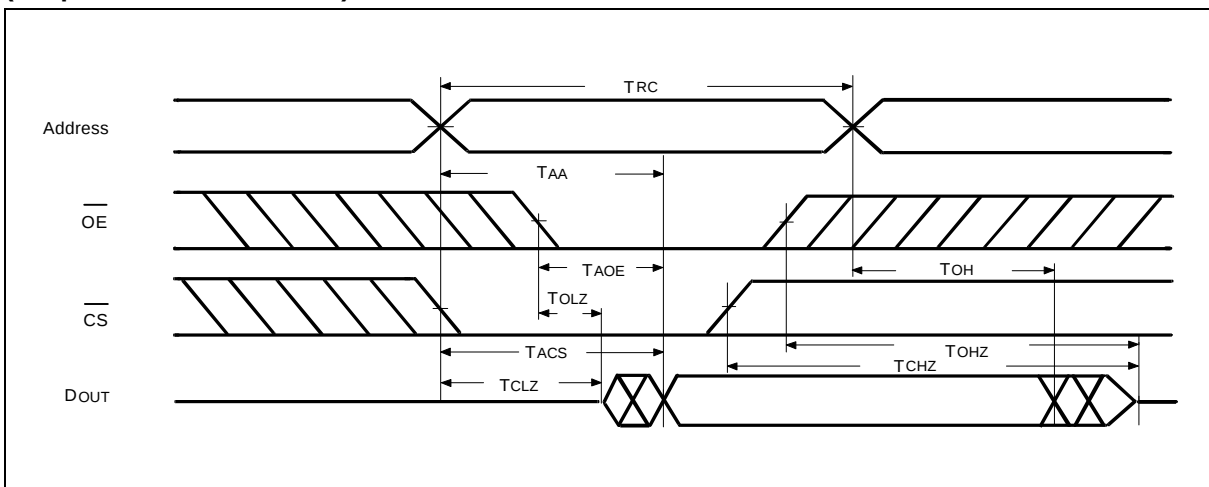
### Read Cycle 2

(Chip Select Controlled)



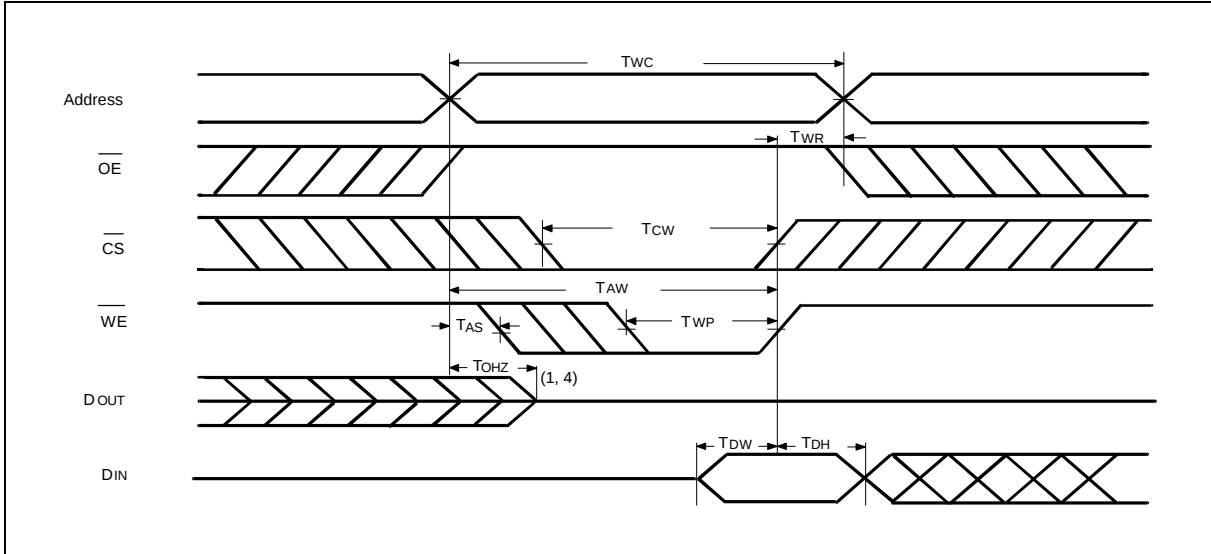
### Read Cycle 3

(Output Enable Controlled)



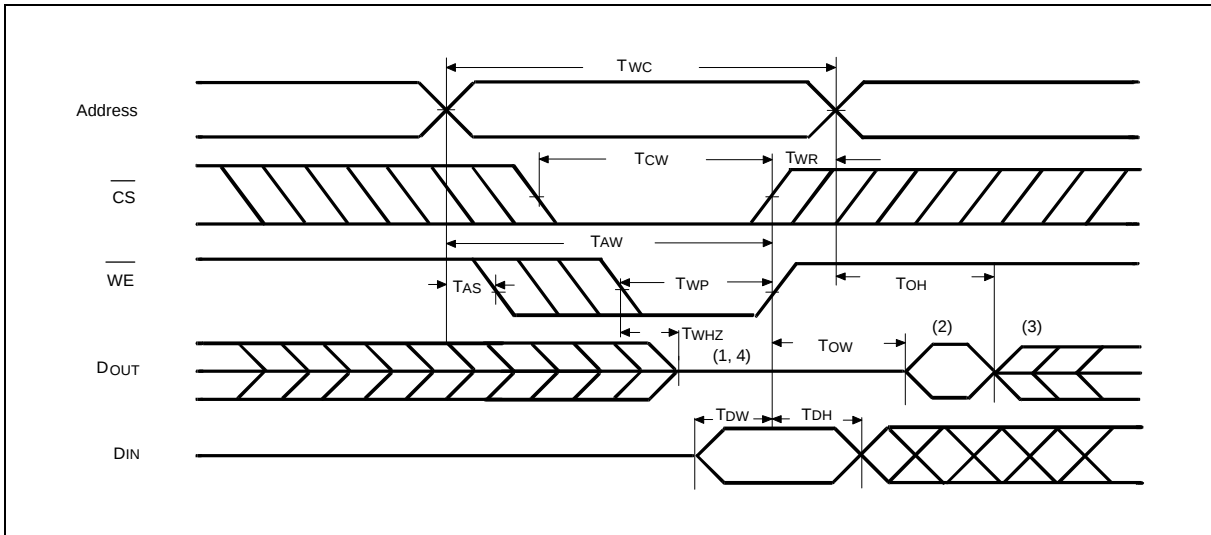
Timing Waveforms, continued

## Write Cycle 1



## Write Cycle 2

( $\overline{OE} = V_{IL}$  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  $\pm 500$  mV from steady state with  $C_L = 5$  pF. This parameter is guaranteed but not 100% tested.

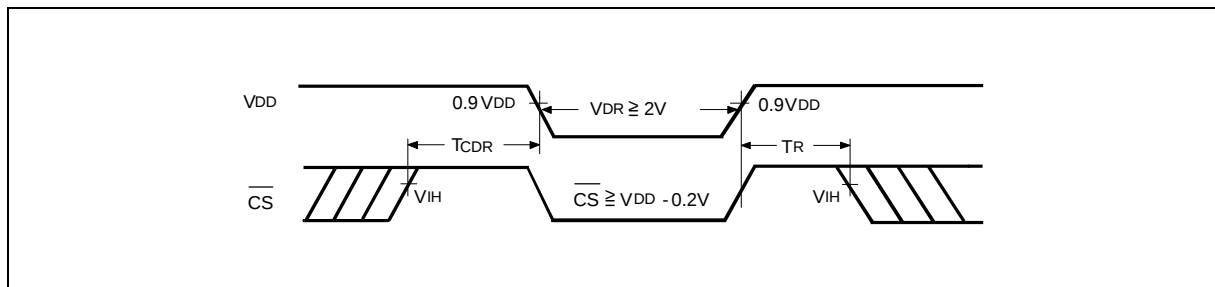
## DATA RETENTION CHARACTERISTICS

(TA = 0° C to 70° C)

| PARAMETER                            | SYM.              | TEST CONDITIONS                                 | MIN.              | TYP. | MAX. | UNIT |
|--------------------------------------|-------------------|-------------------------------------------------|-------------------|------|------|------|
| VDD for Data Retention               | VDR               | $\overline{CS} \geq V_{DD} - 0.2V$              | 2.0               | -    | -    | V    |
| Data Retention Current               | I <sub>DDDR</sub> | $\overline{CS} \geq V_{DD} - 0.2V, V_{DD} = 3V$ | -                 | -    | 2    | μA   |
| Chip Deselect to Data Retention Time | T <sub>CDR</sub>  | See data retention waveform                     | 0                 | -    | -    | nS   |
| Operation Recovery Time              | T <sub>R</sub>    |                                                 | T <sub>RC</sub> * | -    | -    | nS   |

\* Read Cycle Time

## DATA RETENTION WAVEFORM



## ORDERING INFORMATION

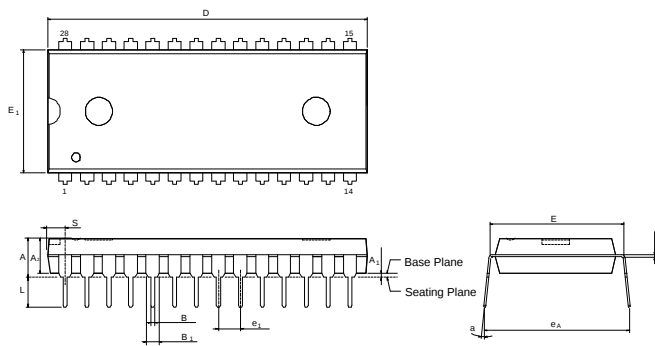
| PART NO.     | ACCESS TIME (nS) | OPERATING CURRENT MAX. (mA) | STANDBY CURRENT MAX. (mA) | PACKAGE                |
|--------------|------------------|-----------------------------|---------------------------|------------------------|
| W24258-55LL  | 55               | 70                          | 5                         | 600 mil DIP            |
| W24258-70LL  | 70               | 60                          | 5                         | 600 mil DIP            |
| W24258S-55LL | 55               | 70                          | 5                         | 330 mil SOP            |
| W24258S-70LL | 70               | 60                          | 5                         | 330 mil SOP            |
| W24258Q-55LL | 55               | 70                          | 5                         | Standard type one TSOP |
| W24258Q-70LL | 70               | 60                          | 5                         | Standard type one TSOP |

Notes:

- Winbond reserves the right to make changes to its products without prior notice.
- 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

### 28-pin P-DIP

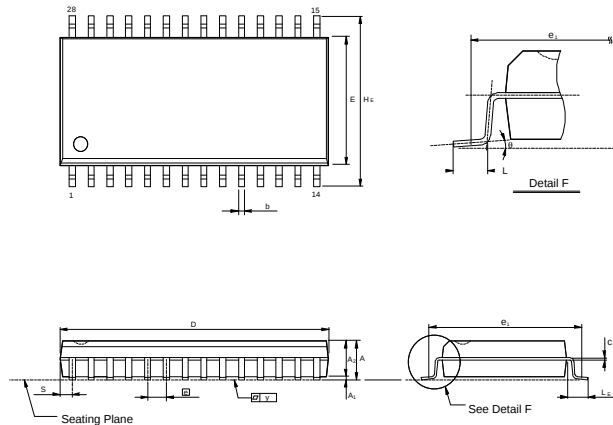


| Symbol         | Dimension in Inches |       |       | Dimension in mm |       |       |
|----------------|---------------------|-------|-------|-----------------|-------|-------|
|                | Min.                | Nom.  | Max.  | Min.            | Nom.  | Max.  |
| A              | —                   | —     | 0.210 | —               | —     | 5.33  |
| A <sub>1</sub> | 0.010               | —     | —     | 0.25            | —     | —     |
| A <sub>2</sub> | 0.150               | 0.155 | 0.160 | 3.81            | 3.94  | 4.06  |
| B              | 0.016               | 0.018 | 0.022 | 0.41            | 0.46  | 0.56  |
| B <sub>1</sub> | 0.058               | 0.060 | 0.064 | 1.47            | 1.52  | 1.63  |
| c              | 0.008               | 0.010 | 0.014 | 0.20            | 0.25  | 0.36  |
| D              | —                   | 1.460 | 1.470 | —               | 37.08 | 37.34 |
| E              | 0.590               | 0.600 | 0.610 | 14.99           | 15.24 | 15.49 |
| E <sub>1</sub> | 0.540               | 0.545 | 0.550 | 13.72           | 13.84 | 13.97 |
| e <sub>1</sub> | 0.090               | 0.100 | 0.110 | 2.29            | 2.54  | 2.79  |
| L              | 0.120               | 0.130 | 0.140 | 3.05            | 3.30  | 3.56  |
| a              | 0                   | —     | 15    | 0               | —     | 15    |
| e <sub>A</sub> | 0.630               | 0.650 | 0.670 | 16.00           | 16.51 | 17.02 |
| S              | —                   | —     | 0.090 | —               | —     | 2.29  |

#### Notes:

1. Dimensions D Max. & S include mold flash or tie bar burrs.
2. Dimension E1 does not include interlead flash.
3. Dimensions D & E1 include mold mismatch and are determined at the mold parting line.
4. Dimension B1 does not include dambar protrusion/intrusion.
5. Controlling dimension: Inches.
6. General appearance spec. should be based on final visual inspection spec.

### 28-pin SOP Wide Body



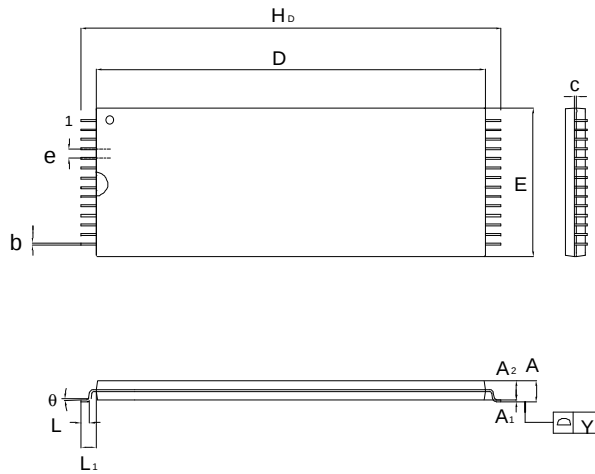
| Symbol         | Dimension in Inches |       |       | Dimension in mm |       |       |
|----------------|---------------------|-------|-------|-----------------|-------|-------|
|                | Min.                | Nom.  | Max.  | Min.            | Nom.  | Max.  |
| A              | —                   | —     | 0.112 | —               | —     | 2.85  |
| A <sub>1</sub> | 0.004               | —     | —     | 0.10            | —     | —     |
| A <sub>2</sub> | 0.093               | 0.098 | 0.103 | 2.36            | 2.49  | 2.62  |
| b              | 0.014               | 0.016 | 0.020 | 0.36            | 0.41  | 0.51  |
| c              | 0.008               | 0.010 | 0.014 | 0.20            | 0.25  | 0.36  |
| D              | —                   | 0.713 | 0.733 | —               | 18.11 | 18.62 |
| E              | 0.326               | 0.331 | 0.336 | 8.28            | 8.41  | 8.53  |
| Ⓢ              | 0.044               | 0.050 | 0.056 | 1.12            | 1.27  | 1.42  |
| H <sub>E</sub> | 0.453               | 0.465 | 0.477 | 11.51           | 11.81 | 12.12 |
| L              | 0.028               | 0.036 | 0.044 | 0.71            | 0.91  | 1.12  |
| L <sub>E</sub> | 0.059               | 0.067 | 0.075 | 1.50            | 1.70  | 1.91  |
| S              | —                   | —     | 0.047 | —               | —     | 1.19  |
| y              | —                   | —     | 0.004 | —               | —     | 0.10  |
| θ              | 0°                  | —     | 10°   | 0°              | —     | 10°   |

#### Notes:

1. Dimensions D Max. & S include mold flash or tie bar burrs.
2. Dimension b does not include dambar protrusion/intrusion.
3. Dimensions D & E include mold mismatch and determined at the mold parting line.
4. Controlling dimension: Inches.
5. General appearance spec. should be based on final visual inspection spec.

Package Dimensions, continued

## 28-pin Standard Type One TSOP



| Symbol         | Dimension In Inches |       |       | Dimension 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> | 0.035               | 0.040 | 0.041 | 0.95            | 1.00  | 1.05  |
| b              | 0.007               | 0.008 | 0.011 | 0.17            | 0.20  | 0.27  |
| c              | 0.004               | 0.006 | 0.008 | 0.10            | 0.15  | 0.21  |
| 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 <sub>D</sub> | 0.520               | 0.528 | 0.536 | 13.20           | 13.40 | 13.60 |
| e              |                     | 0.022 |       |                 | 0.55  |       |
| L              | 0.020               | 0.024 | 0.028 | 0.50            | 0.60  | 0.70  |
| L <sub>1</sub> |                     | 0.010 |       |                 | 0.25  |       |
| Y              | 0.000               |       | 0.004 | 0.00            |       | 0.10  |
| θ              | 0                   | 3     | 5     | 0               | 3     | 5     |

Controlling dimension: Millimeters



## VERSION HISTORY

| VERSION | DATE      | PAGE       | DESCRIPTION                                                                                                              |
|---------|-----------|------------|--------------------------------------------------------------------------------------------------------------------------|
| A4      | Apr. 1998 | 2          | Add standby power supply current (I <sub>SB1</sub> ) typical parameter when operation temperature T <sub>A</sub> = 25° C |
| A5      | Nov. 1998 | 1, 2, 7, 9 | Deduct reverse type one TSOP package                                                                                     |



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