



32K × 8 CMOS STATIC RAM

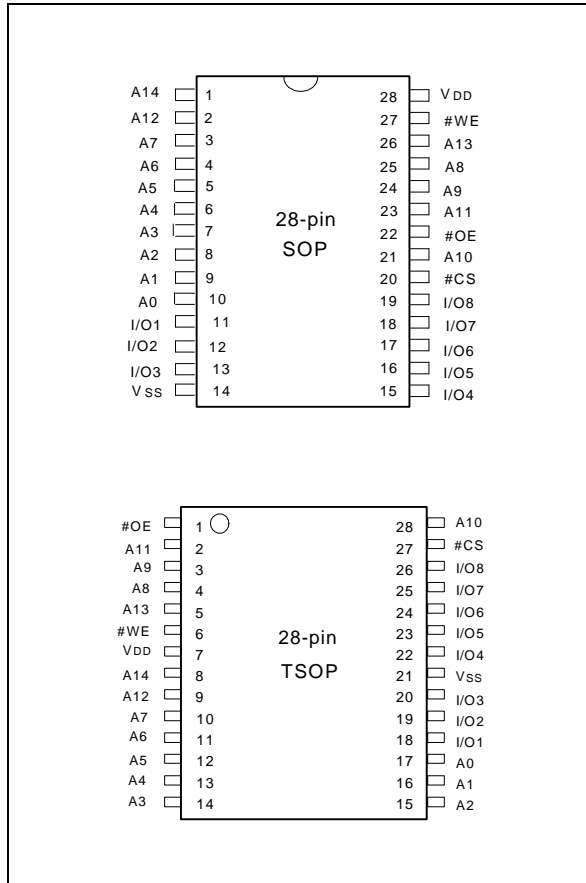
GENERAL DESCRIPTION

The W24257 is a slow speed, 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.

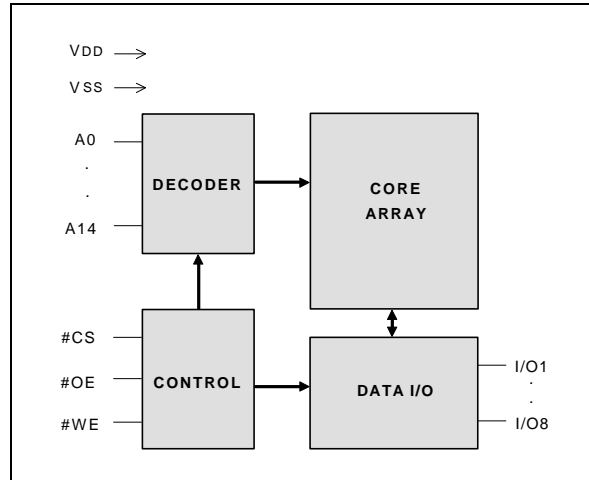
FEATURES

- Low power consumption:
 - Active: 325 mW (max.)
 - Standby: 75 μW (max.) (LL-version)
150 μW (max.) (L-version)
- Access time: 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 330 mil SOP, standard type one TSOP (8 mm x 13.4 mm)

PIN CONFIGURATIONS



BLOCK DIAGRAM



PIN DESCRIPTION

| SYMBOL | DESCRIPTION |
|-----------|---------------------|
| A0–A14 | Address Inputs |
| I/O1–I/O8 | Data Inputs/Outputs |
| #CS | Chip Select Input |
| #WE | Write Enable Input |
| #OE | Output Enable Input |
| VDD | Power Supply |
| VSS | Ground |



TRUTH TABLE

| #CS | #OE | #WE | MODE | I/O1 - I/O8 | V _{DD} CURRENT |
|-----|-----|-----|----------------|-------------|-------------------------|
| H | X | X | Not Selected | High Z | ISB, ISB1 |
| L | H | H | Output Disable | High Z | I _{DD} |
| L | L | H | Read | Data Out | I _{DD} |
| L | X | L | Write | Data In | I _{DD} |

DC CHARACTERISTICS

Absolute Maximum Ratings

| PARAMETER | RATING | UNIT |
|---|------------------------------|------|
| Supply Voltage to V _{SS} Potential | -0.5 to +7.0 | 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} = 5V ±10%, V_{SS} = 0V, T_A = 0 to 70° C for LL/L; -20 to 85° C for LE)

| PARAMETER | SYM. | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT | |
|--------------------------------|-----------------|--|-------|------|----------------------|------|----|
| Input Low Voltage | V _{IL} | - | -0.5 | - | +0.8 | V | |
| Input High Voltage | V _{IH} | - | +2.2 | - | V _{DD} +0.5 | V | |
| Input Leakage Current | I _{LI} | V _{IN} = V _{SS} to V _{DD} | -2 | - | +2 | μA | |
| Output Leakage Current | I _{LO} | V _{I/O} = V _{SS} to V _{DD} , #CS = V _{IH} (min.) or #OE = V _{IH} (min.) or #WE = V _{IL} (max.) | -2 | - | +2 | μA | |
| Output Low Voltage | V _{OL} | I _{OL} = +4.0 mA | - | - | 0.4 | V | |
| Output High Voltage | V _{OH} | I _{OH} = -1.0 mA | 2.4 | - | - | V | |
| Operating Power Supply Current | I _{DD} | #CS = V _{IL} (min.), I/O = 0 mA Cycle = min., Duty = 100% | - | - | 70 | mA | |
| Standby Power Supply Current | ISB | #CS = V _{IH} (min.) Cycle = min., Duty = 100% | - | - | 3 | mA | |
| | ISB1 | #CS ≥ V _{DD} -0.2V | LL/LE | - | - | 15 | μA |
| | | | L | - | - | 30 | μA |

Note: Typical characteristics are at V_{DD} = 5V, T_A = 25° C.



CAPACITANCE

(V_{DD} = 5V, 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 |

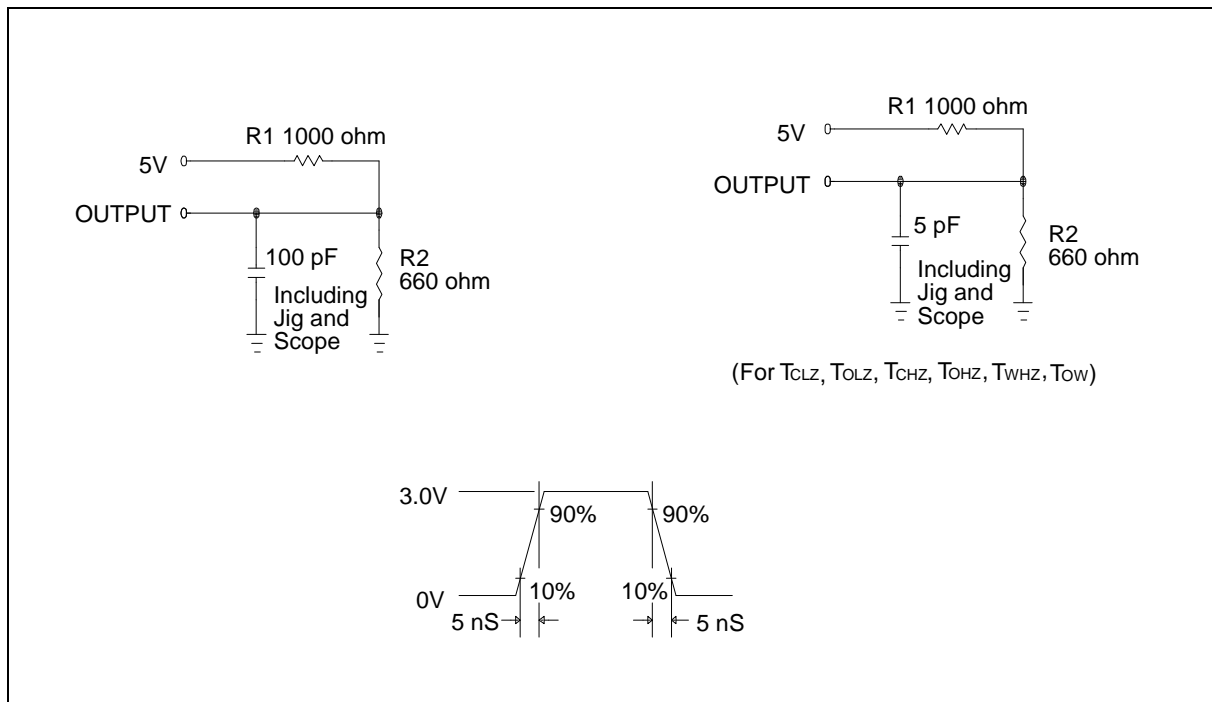
Note: These parameters are sampled but not 100% tested.

AC CHARACTERISTICS

AC Test Conditions

| PARAMETER | CONDITIONS |
|---|--|
| Input Pulse Levels | 0.6V to 2.4V |
| Input Rise and Fall Times | 5 nS |
| Input and Output Timing Reference Level | 1.5V |
| Output Load | CL = 100 pF, I _{OH} /I _{OL} = -1 mA/4 mA |

AC Test Loads and Waveform





AC Characteristics, continued

(V_{DD} = 5V ±10%, V_{SS} = 0V, T_A = 0 to 70° C for LL/L; -20 to 85° C for LE)**Read Cycle**

| PARAMETER | SYMBOL | W24257-70 | | 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

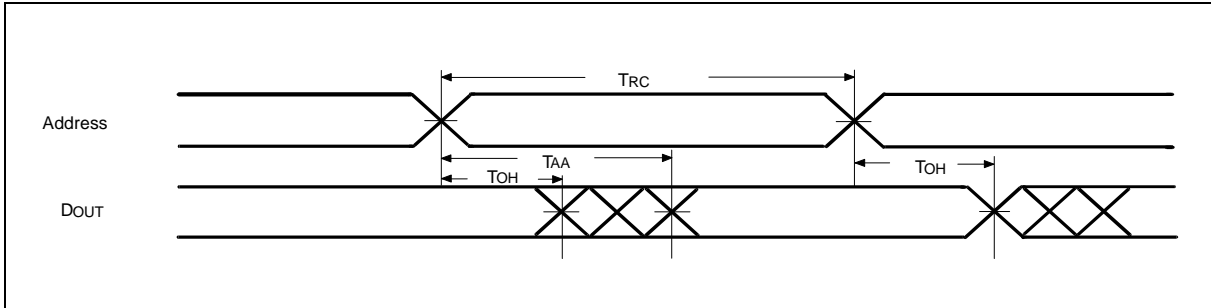
| PARAMETER | SYMBOL | W24257-70 | | UNIT | |
|------------------------------------|----------|-----------|------|------|----|
| | | MIN. | MAX. | | |
| Write Cycle Time | TWC | 70 | - | nS | |
| Chip Selection to End of Write | TCW | 60 | - | nS | |
| Address Valid to End of Write | TAW | 60 | - | nS | |
| Address Setup Time | TAS | 0 | - | nS | |
| Write Pulse Width | TWP | 45 | - | nS | |
| Write Recovery Time | #CS, #WE | TWR | 0 | - | nS |
| Data Valid to End of Write | TDW | 30 | - | nS | |
| Data Hold from End of Write | TDH | 0 | - | nS | |
| Write to Output in High Z | TWHZ* | - | 30 | nS | |
| Output Disable to Output in High Z | TOHZ* | - | 30 | nS | |
| Output Active from End of Write | TOW | 0 | - | nS | |

* These parameters are sampled but not 100% tested

TIMING WAVEFORMS

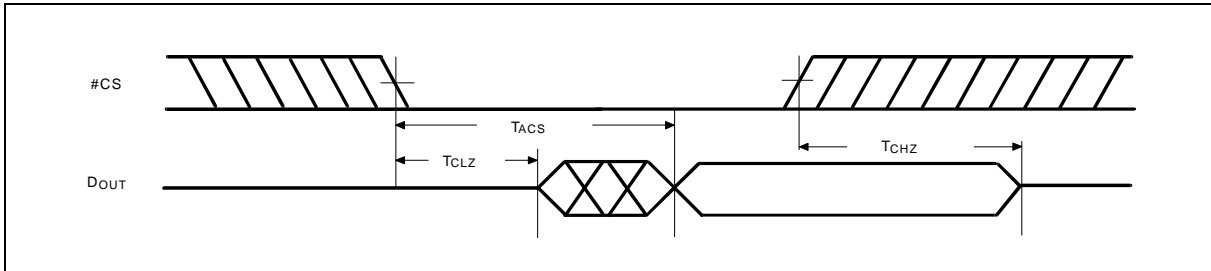
Read Cycle 1

(Address Controlled)



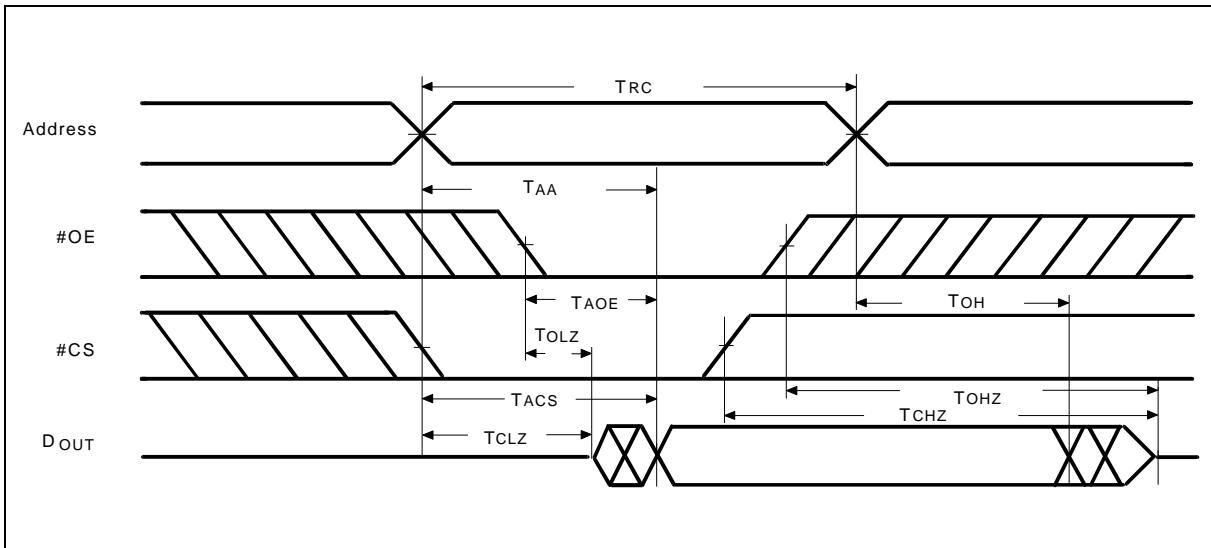
Read Cycle 2

(Chip Select Controlled)



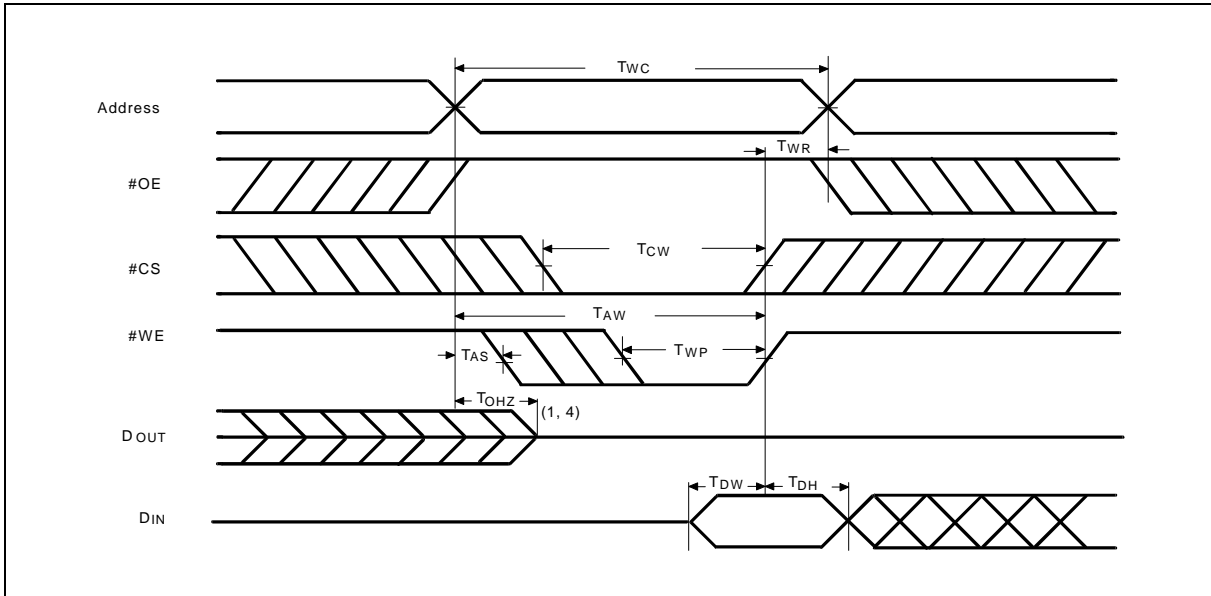
Read Cycle 3

(Output Enable Controlled)



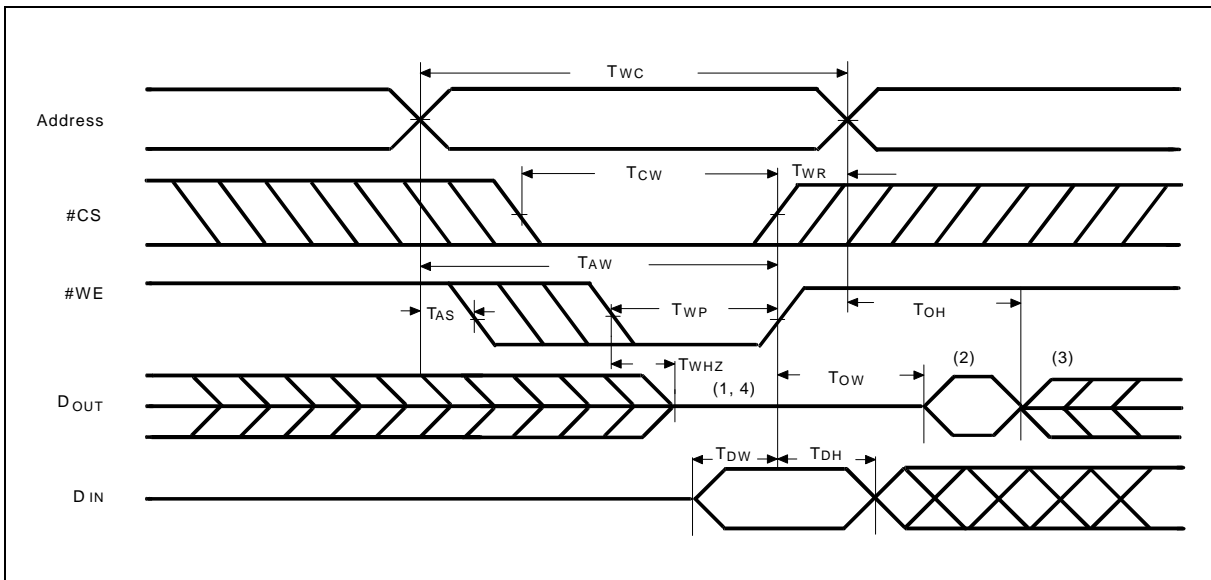
Timing Waveforms, continued

Write Cycle 1



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 D_{OUT} are the same as the data written to D_{IN} during the write cycle.
3. D_{OUT} 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.



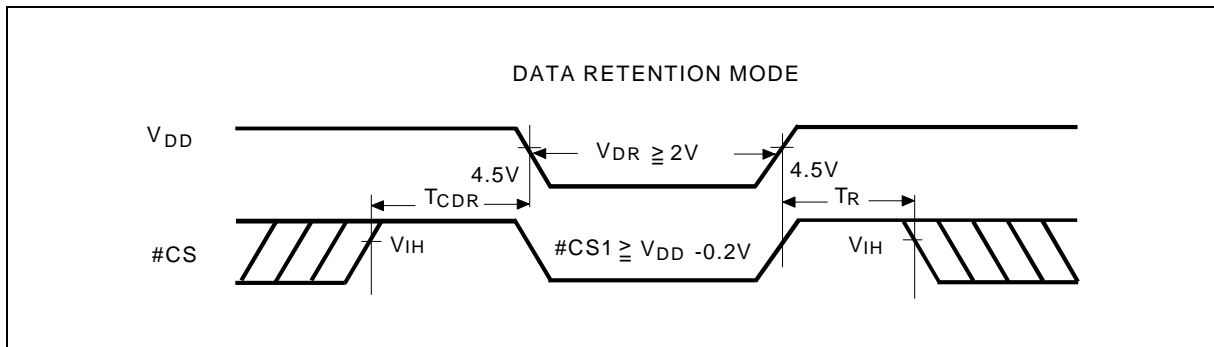
DATA RETENTION CHARACTERISTICS

(TA = 0 to 70° C for LL/L; -20 to 85° C for LE)

| PARAMETER | SYM. | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT | |
|--------------------------------------|-------|--------------------|-------|------|------|------|----|
| VDD for Data Retention | VDR | #CS ≥ VDD -0.2V | 2.0 | - | - | V | |
| Data Retention Current | IDDDR | #CS ≥ VDD -0.2V | LL/LE | - | - | 15 | μA |
| | | VDD = 3V | L | - | - | 30 | μA |
| Chip Deselect to Data Retention Time | TCDR | See data retention | 0 | - | - | nS | |
| Operation Recovery Time | TR | Waveform | TRC* | - | - | nS | |

TRC* = Read Cycle Time

DATA RETENTION WAVEFORM



ORDERING INFORMATION

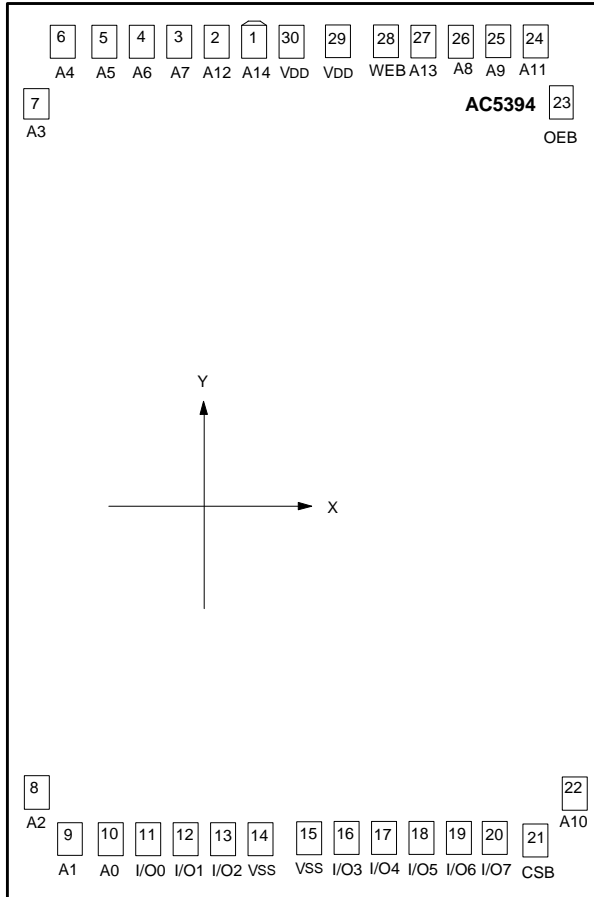
| PART NO. | ACCESS TIME (nS) | OPERATING CURRENT MAX. (mA) | STANDBY CURRENT MAX. (mA) | OPERATING TEMP. (°C) | PACKAGE |
|--------------|------------------|-----------------------------|---------------------------|----------------------|------------------------|
| W24257S-70LL | 70 | 70 | 15 | 0 to 70 | 330 mil SOP |
| W24257S-70L | 70 | 70 | 30 | 0 to 70 | 330 mil SOP |
| W24257S-70LE | 70 | 70 | 15 | -20 to 85 | 330 mil SOP |
| W24257Q-70LL | 70 | 70 | 15 | 0 to 70 | Standard type one TSOP |
| W24257Q-70L | 70 | 70 | 30 | 0 to 70 | Standard type one TSOP |
| W24257Q-70LE | 70 | 70 | 15 | -20 to 85 | 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.



BONDING PAD DIAGRAM



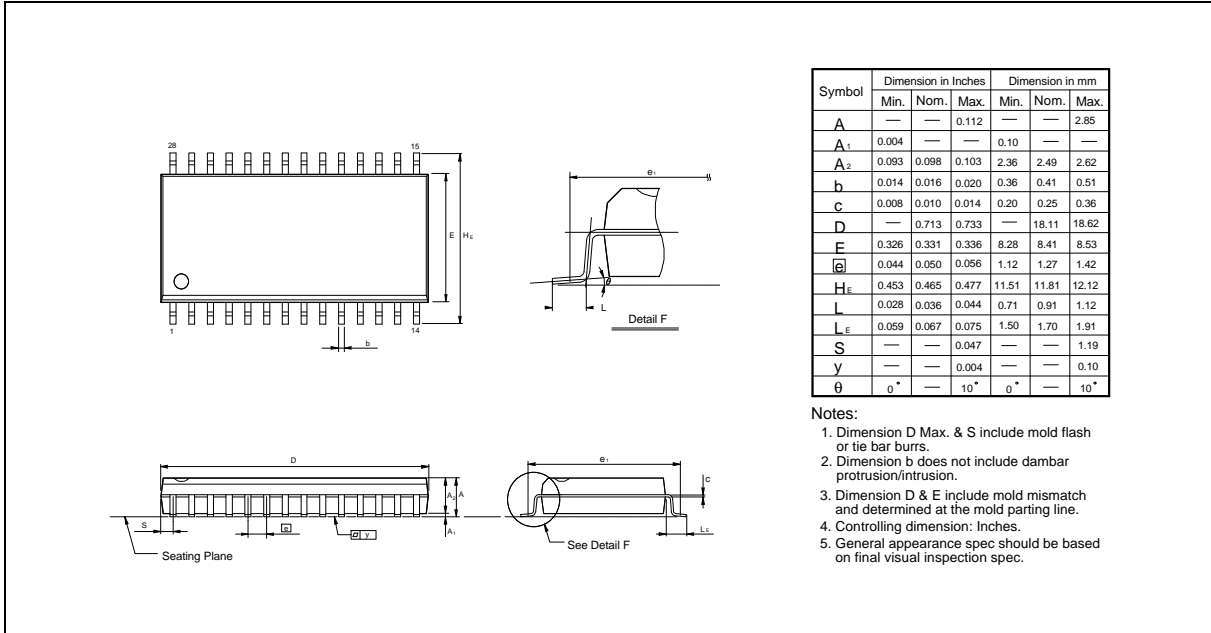
| PAD NO. | X | Y |
|---------|---------|----------|
| 1 | -232.25 | 1445.22 |
| 2 | -351.70 | 1445.22 |
| 3 | -471.15 | 1445.22 |
| 4 | -590.60 | 1445.22 |
| 5 | -710.05 | 1445.22 |
| 6 | -829.50 | 1445.22 |
| 7 | -992.79 | 1362.24 |
| 8 | -992.79 | -1306.11 |
| 9 | -857.86 | -1452.79 |
| 10 | -738.41 | -1452.79 |
| 11 | -594.84 | -1414.13 |
| 12 | -451.06 | -1414.13 |
| 13 | -310.67 | -1414.13 |
| 14 | -171.78 | -1405.28 |
| 15 | 24.45 | -1405.28 |
| 16 | 151.80 | -1414.13 |
| 17 | 298.07 | -1414.13 |
| 18 | 443.28 | -1414.13 |
| 19 | 588.20 | -1414.13 |
| 20 | 732.84 | -1414.13 |
| 21 | 871.11 | -1452.79 |
| 22 | 992.75 | -1312.15 |
| 23 | 992.75 | 1373.67 |
| 24 | 810.09 | 1445.22 |
| 25 | 690.64 | 1445.22 |
| 26 | 571.19 | 1445.22 |
| 27 | 451.74 | 1445.22 |
| 28 | 332.29 | 1445.22 |
| 29 | 120.25 | 1444.65 |
| 30 | -93.23 | 1444.65 |

Note: For bare chip form (C.O.B.) applications, the substrate must be connected to VDD or left floating in the PCB layout.

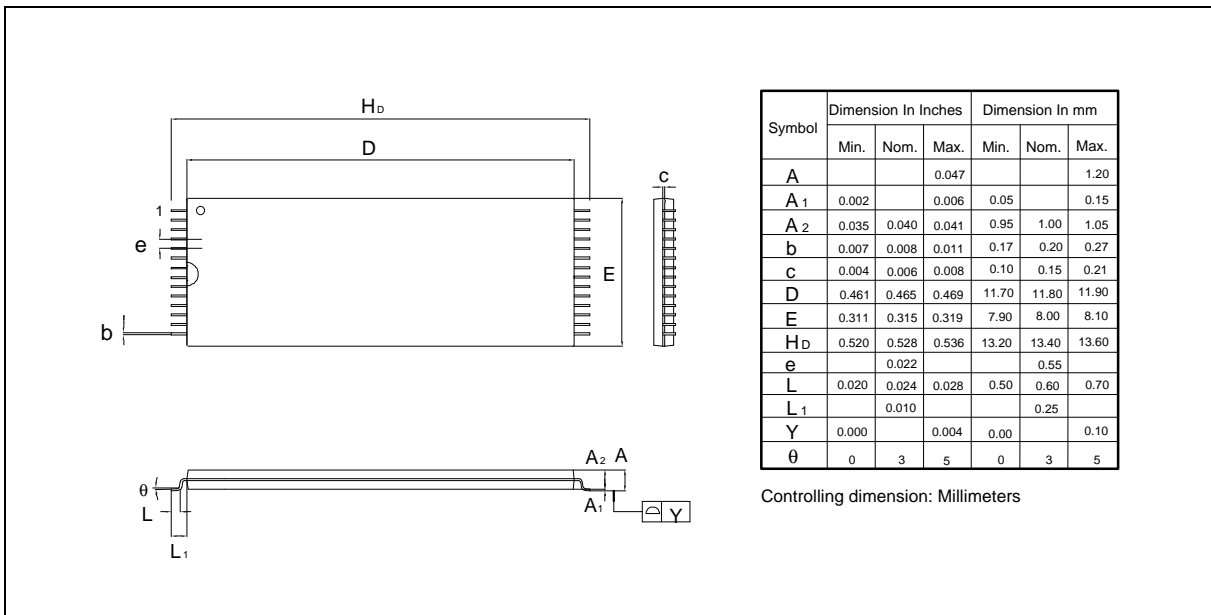


PACKAGE DIMENSIONS

28-pin SO Wide Body



28-pin Standard Type One TSOP





VERSION HISTORY

| VERSION | DATE | PAGE | DESCRIPTION |
|---------|-----------|---------|--|
| A12 | Nov. 1999 | 1, 2, 7 | Change the IDD, ISB, ISB1 |
| | | 4, 7 | Remove the W24257-10 spc. |
| A13 | Apr. 2000 | 7 | Typo correction in Standby Current Max.: mA->μA |
| A14 | May 2000 | 1, 7, 8 | Delete 28-pin DIP Package |
| | | 8 | Add in Bonding Pad Diagram |
| A15 | Nov. 2000 | 2 | Modify Operating Power Supply Current (IDD) as 70 mA |
| | | 1 | Add in TSOP Pin Configuration |
| A16 | Feb. 2001 | 2, 4, 7 | Add in LE grade |



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