

## Octal D-type transparent latch (3-State)

## 74ABT573A

## FEATURES

- 74ABT573A is flow-through pinout version of 74ABT373
- Inputs and outputs on opposite side of package allow easy interface to microprocessors
- 3-State output buffers
- Common output enable
- Latch-up protection exceeds 500mA per JEDEC Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- Power-up 3-State
- Power-up reset

## DESCRIPTION

The 74ABT573A high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT573A device is an octal transparent latch coupled to eight 3-State output buffers. The two sections of the device are controlled independently by Enable (E) and Output Enable ( $\overline{OE}$ ) control gates. The 74ABT573A is functionally identical to the 74ABT373 but has a flow-through pinout configuration to facilitate PC board layout and allow easy interface with microprocessors.

The data on the D inputs are transferred to the latch outputs when the Latch Enable (E) input is High. The latch remains transparent to the data inputs while E is High, and stores the data that is present one setup time before the High-to-Low enable transition.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors. The active-Low Output Enable ( $\overline{OE}$ ) controls all eight 3-State buffers independent of the latch operation.

When  $\overline{OE}$  is Low, the latched or transparent data appears at the outputs. When  $\overline{OE}$  is High, the outputs are in the High-impedance "OFF" state, which means they will neither drive nor load the bus.

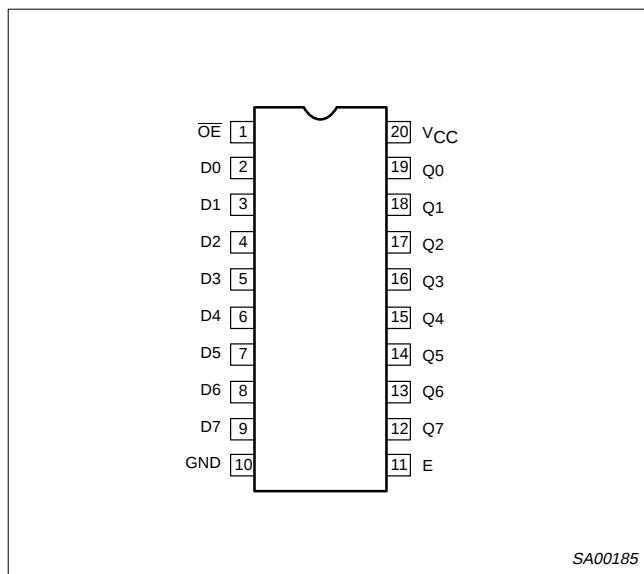
## QUICK REFERENCE DATA

| SYMBOL                 | PARAMETER                     | CONDITIONS<br>$T_{amb} = 25^{\circ}\text{C}; GND = 0V$ | TYPICAL    | UNIT          |
|------------------------|-------------------------------|--------------------------------------------------------|------------|---------------|
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>Dn to Qn | $C_L = 50\text{pF}; V_{CC} = 5V$                       | 2.8<br>3.3 | ns            |
| $C_{IN}$               | Input capacitance             | $V_I = 0V$ or $V_{CC}$                                 | 3          | pF            |
| $C_{OUT}$              | Output capacitance            | Outputs disabled; $V_O = 0V$ or $V_{CC}$               | 6          | pF            |
| $I_{CCZ}$              | Total supply current          | Outputs disabled; $V_{CC} = 5.5V$                      | 100        | $\mu\text{A}$ |

## ORDERING INFORMATION

| PACKAGES                    | TEMPERATURE RANGE                              | OUTSIDE NORTH AMERICA | NORTH AMERICA  | DWG NUMBER |
|-----------------------------|------------------------------------------------|-----------------------|----------------|------------|
| 20-Pin Plastic DIP          | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74ABT573A N           | 74ABT573A N    | SOT146-1   |
| 20-Pin plastic SO           | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74ABT573A D           | 74ABT573A D    | SOT163-1   |
| 20-Pin Plastic SSOP Type II | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74ABT573A DB          | 74ABT573A DB   | SOT339-1   |
| 20-Pin Plastic TSSOP Type I | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74ABT573A PW          | 74ABT573APW DH | SOT360-1   |

## PIN CONFIGURATION



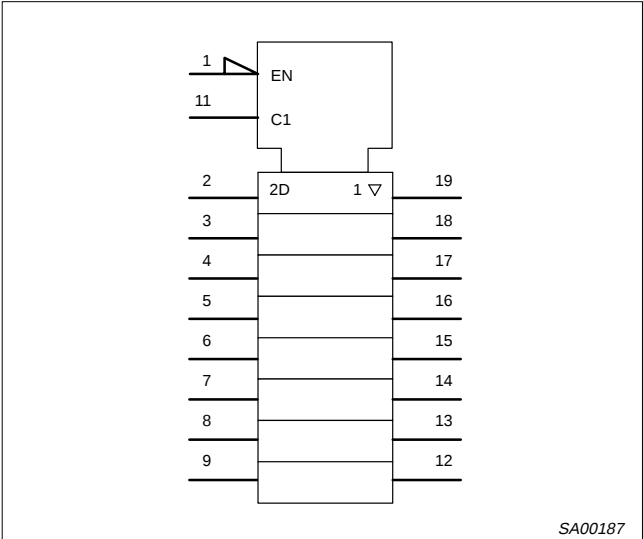
## PIN DESCRIPTION

| PIN NUMBER                           | SYMBOL          | FUNCTION                         |
|--------------------------------------|-----------------|----------------------------------|
| 1                                    | $\overline{OE}$ | Output enable input (active-Low) |
| 2, 3, 4, 5,<br>6, 7, 8, 9            | D0-D7           | Data inputs                      |
| 19, 18, 17,<br>16, 15, 14,<br>13, 12 | Q0-Q7           | Data outputs                     |
| 11                                   | E               | Enable input (active-High)       |
| 10                                   | GND             | Ground (0V)                      |
| 20                                   | $V_{CC}$        | Positive supply voltage          |

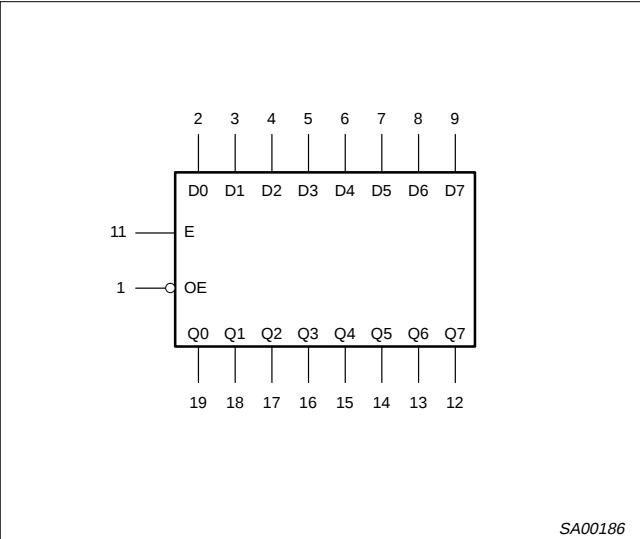
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LOGIC SYMBOL (IEEE/IEC)



LOGIC SYMBOL

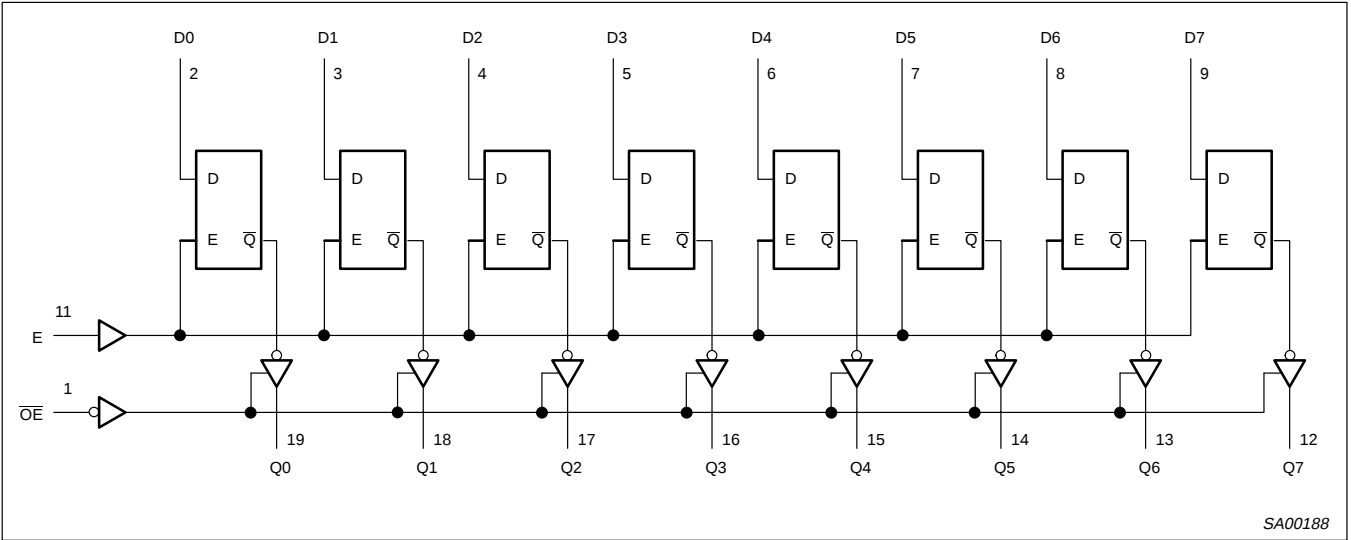


FUNCTION TABLE

| INPUTS |        |         | INTERNAL REGISTER | OUTPUTS | OPERATING MODE           |
|--------|--------|---------|-------------------|---------|--------------------------|
| OE     | E      | Dn      |                   | Q0 - Q7 |                          |
| L<br>L | H<br>H | L<br>H  | L<br>H            | L<br>H  | Enable and read register |
| L<br>L | ↓<br>↓ | L<br>h  | L<br>H            | L<br>H  | Latch and read register  |
| L      | L      | X       | NC                | NC      | Hold                     |
| H<br>H | L<br>H | X<br>Dn | NC<br>Dn          | Z<br>Z  | Disable outputs          |

H = High voltage level  
h = High voltage level one set-up time prior to the High-to-Low E transition  
L = Low voltage level  
l = Low voltage level one set-up time prior to the High-to-Low E transition  
NC= No change  
X = Don't care  
Z = High impedance "off" state  
↓ = High-to-Low E transition

LOGIC DIAGRAM



## Octal D-type transparent latch (3-State)

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**ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>**

| SYMBOL    | PARAMETER                      | CONDITIONS                  | RATING       | UNIT |
|-----------|--------------------------------|-----------------------------|--------------|------|
| $V_{CC}$  | DC supply voltage              |                             | −0.5 to +7.0 | V    |
| $I_{IK}$  | DC input diode current         | $V_I < 0$                   | −18          | mA   |
| $V_I$     | DC input voltage <sup>3</sup>  |                             | −1.2 to +7.0 | V    |
| $I_{OK}$  | DC output diode current        | $V_O < 0$                   | −50          | mA   |
| $V_{OUT}$ | DC output voltage <sup>3</sup> | output in Off or High state | −0.5 to +5.5 | V    |
| $I_{OUT}$ | DC output current              | output in Low state         | 128          | mA   |
| $T_{Stg}$ | Storage temperature range      |                             | −65 to 150   | °C   |

**NOTES:**

1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

**RECOMMENDED OPERATING CONDITIONS**

| SYMBOL              | PARAMETER                            | LIMITS |          | UNIT |
|---------------------|--------------------------------------|--------|----------|------|
|                     |                                      | Min    | Max      |      |
| $V_{CC}$            | DC supply voltage                    | 4.5    | 5.5      | V    |
| $V_I$               | Input voltage                        | 0      | $V_{CC}$ | V    |
| $V_{IH}$            | High-level input voltage             | 2.0    |          | V    |
| $V_{IL}$            | Low-level input voltage              |        | 0.8      | V    |
| $I_{OH}$            | High-level output current            |        | −32      | mA   |
| $I_{OL}$            | Low-level output current             |        | 64       | mA   |
| $\Delta t/\Delta v$ | Input transition rise or fall rate   | 0      | 5        | ns/V |
| $T_{amb}$           | Operating free-air temperature range | −40    | +85      | °C   |

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## DC ELECTRICAL CHARACTERISTICS

| SYMBOL                           | PARAMETER                                            | TEST CONDITIONS                                                                                                      | LIMITS                   |       |      |                                   |      | UNIT |
|----------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------|-------|------|-----------------------------------|------|------|
|                                  |                                                      |                                                                                                                      | T <sub>amb</sub> = +25°C |       |      | T <sub>amb</sub> = −40°C to +85°C |      |      |
|                                  |                                                      |                                                                                                                      | Min                      | Typ   | Max  | Min                               | Max  |      |
| V <sub>IK</sub>                  | Input clamp voltage                                  | V <sub>CC</sub> = 4.5V; I <sub>IK</sub> = −18mA                                                                      |                          | −0.9  | −1.2 |                                   | −1.2 | V    |
| V <sub>OH</sub>                  | High-level output voltage                            | V <sub>CC</sub> = 4.5V; I <sub>OH</sub> = −3mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                  | 2.5                      | 2.9   |      | 2.5                               |      | V    |
|                                  |                                                      | V <sub>CC</sub> = 5.0V; I <sub>OH</sub> = −3mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                  | 3.0                      | 3.4   |      | 3.0                               |      | V    |
|                                  |                                                      | V <sub>CC</sub> = 4.5V; I <sub>OH</sub> = −32mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                 | 2.0                      | 2.4   |      | 2.0                               |      | V    |
| V <sub>OL</sub>                  | Low-level output voltage                             | V <sub>CC</sub> = 4.5V; I <sub>OL</sub> = 64mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                  |                          | 0.42  | 0.55 |                                   | 0.55 | V    |
| V <sub>RST</sub>                 | Power-up output low voltage <sup>3</sup>             | V <sub>CC</sub> = 5.5V; I <sub>O</sub> = 1mA; V <sub>I</sub> = GND or V <sub>CC</sub>                                |                          | 0.13  | 0.55 |                                   | 0.55 | V    |
| I <sub>I</sub>                   | Input leakage current                                | V <sub>CC</sub> = 5.5V; V <sub>I</sub> = GND or 5.5V                                                                 |                          | ±0.01 | ±1.0 |                                   | ±1.0 | μA   |
| I <sub>OFF</sub>                 | Power-off leakage current                            | V <sub>CC</sub> = 0.0V; V <sub>O</sub> or V <sub>I</sub> ≤ 4.5V                                                      |                          | ±5.0  | ±100 |                                   | ±100 | μA   |
| I <sub>PU</sub> /I <sub>PD</sub> | Power-up/down 3-State output current <sup>4</sup>    | V <sub>CC</sub> = 2.0V; V <sub>O</sub> = 0.5V; $\sqrt{V_{OE}}$ = Don't Care; V <sub>I</sub> = GND or V <sub>CC</sub> |                          | ±5.0  | ±50  |                                   | ±50  | μA   |
| I <sub>OZH</sub>                 | 3-State output High current                          | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 2.7V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                   |                          | 5.0   | 50   |                                   | 50   | μA   |
| I <sub>OZL</sub>                 | 3-State output Low current                           | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 0.5V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                   |                          | −5.0  | −50  |                                   | −50  | μA   |
| I <sub>CEX</sub>                 | Output High leakage current                          | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 5.5V; V <sub>I</sub> = GND or V <sub>CC</sub>                               |                          | 5.0   | 50   |                                   | 50   | μA   |
| I <sub>O</sub>                   | Output current <sup>1</sup>                          | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 2.5V                                                                        | −40                      |       | −180 | −40                               | −180 | mA   |
| I <sub>CCH</sub>                 | Quiescent supply current                             | V <sub>CC</sub> = 5.5V; Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub>                                        |                          | 100   | 250  |                                   | 250  | μA   |
| I <sub>CCL</sub>                 |                                                      | V <sub>CC</sub> = 5.5V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub>                                         |                          | 24    | 30   |                                   | 30   | mA   |
| I <sub>CCZ</sub>                 |                                                      | V <sub>CC</sub> = 5.5V; Outputs 3-State; V <sub>I</sub> = GND or V <sub>CC</sub>                                     |                          | 100   | 250  |                                   | 250  | μA   |
| ΔI <sub>CC</sub>                 | Additional supply current per input pin <sup>2</sup> | V <sub>CC</sub> = 5.5V; one input at 3.4V, other inputs at V <sub>CC</sub> or GND                                    |                          | 0.5   | 1.5  |                                   | 1.5  | mA   |

## NOTES:

1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
2. This is the increase in supply current for each input at 3.4V.
3. For valid test results, data must not be loaded into the flip-flops (or latches) after applying the power.
4. This parameter is valid for any V<sub>CC</sub> between 0V and 2.1V with a transition time of up to 10msec. For V<sub>CC</sub> = 2.1V to V<sub>CC</sub> = 5V ± 10%, a transition time of up to 100µsec is permitted.

## AC CHARACTERISTICS

GND = 0V, t<sub>R</sub> = t<sub>F</sub> = 2.5ns, C<sub>L</sub> = 50pF, R<sub>L</sub> = 500Ω

| SYMBOL                               | PARAMETER                                      | WAVEFORM | LIMITS                                              |            |            |                                                                  |            | UNIT |
|--------------------------------------|------------------------------------------------|----------|-----------------------------------------------------|------------|------------|------------------------------------------------------------------|------------|------|
|                                      |                                                |          | T <sub>amb</sub> = +25°C<br>V <sub>CC</sub> = +5.0V |            |            | T <sub>amb</sub> = -40 to +85°C<br>V <sub>CC</sub> = +5.0V ±0.5V |            |      |
|                                      |                                                |          | Min                                                 | Typ        | Max        | Min                                                              | Max        |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>Dn to Qn                  | 2        | 1.5<br>2.2                                          | 2.8<br>3.3 | 4.0<br>4.8 | 1.5<br>2.2                                                       | 4.5<br>5.3 | ns   |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>E to Qn                   | 1        | 1.2<br>1.8                                          | 2.5<br>3.0 | 4.0<br>4.4 | 1.2<br>1.8                                                       | 4.5<br>4.7 | ns   |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output enable time<br>to High and Low level    | 4<br>5   | 1.2<br>2.7                                          | 3.0<br>3.8 | 4.5<br>5.3 | 1.2<br>2.7                                                       | 5.2<br>5.7 | ns   |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output disable time<br>from High and Low level | 4<br>5   | 1.5<br>1.2                                          | 2.8<br>2.2 | 4.1<br>3.4 | 1.5<br>1.2                                                       | 4.5<br>3.8 | ns   |

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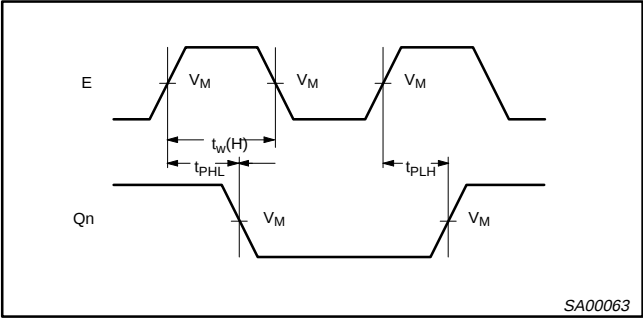
AC SETUP REQUIREMENTS

GND = 0V,  $t_R = t_F = 2.5\text{ns}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 500\Omega$

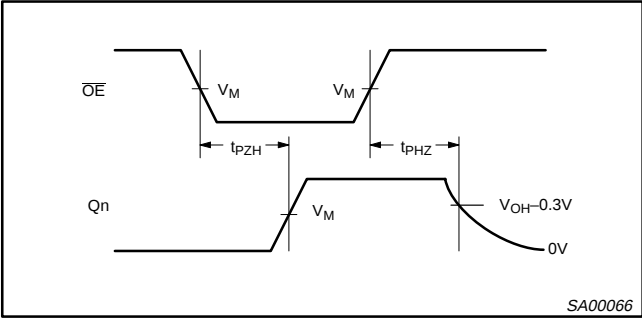
| SYMBOL                             | PARAMETER                          | WAVEFORM | LIMITS                                                                   |              |                                                                                                          | UNIT |
|------------------------------------|------------------------------------|----------|--------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------|------|
|                                    |                                    |          | $T_{\text{amb}} = +25^{\circ}\text{C}$<br>$V_{\text{CC}} = +5.0\text{V}$ |              | $T_{\text{amb}} = -40 \text{ to } +85^{\circ}\text{C}$<br>$V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$ |      |
|                                    |                                    |          | Min                                                                      | Typ          | Min                                                                                                      |      |
| $t_S(\text{H})$<br>$t_S(\text{L})$ | Setup time, High or Low<br>Dn to E | 3        | 1.0<br>1.0                                                               | 0.3<br>0.2   | 1.0<br>1.0                                                                                               | ns   |
| $t_h(\text{H})$<br>$t_h(\text{L})$ | Hold time, High or Low<br>Dn to E  | 3        | 1.0<br>1.0                                                               | -0.1<br>-0.2 | 1.0<br>1.0                                                                                               | ns   |
| $t_w(\text{H})$                    | E pulse width<br>High              | 1        | 2.0                                                                      | 0.7          | 2.0                                                                                                      | ns   |

AC WAVEFORMS

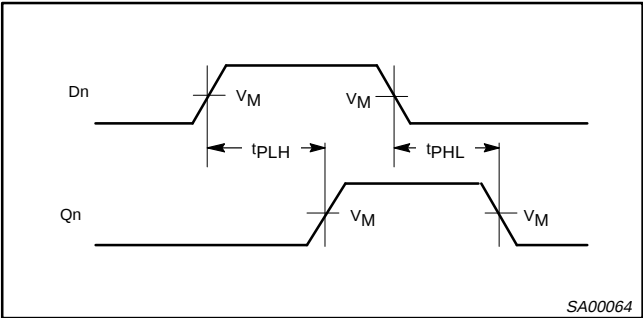
$V_M = 1.5\text{V}$ ,  $V_{\text{IN}} = \text{GND to } 3.0\text{V}$



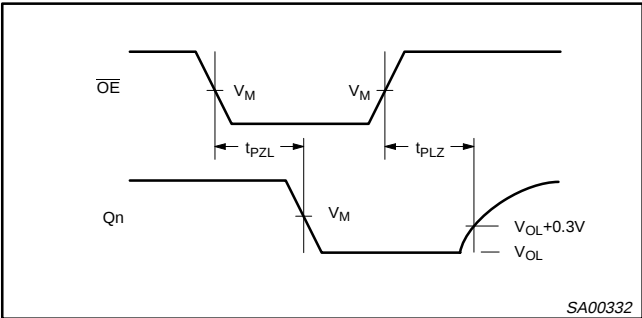
Waveform 1. Propagation Delay, Enable to Output, and Enable Pulse Width



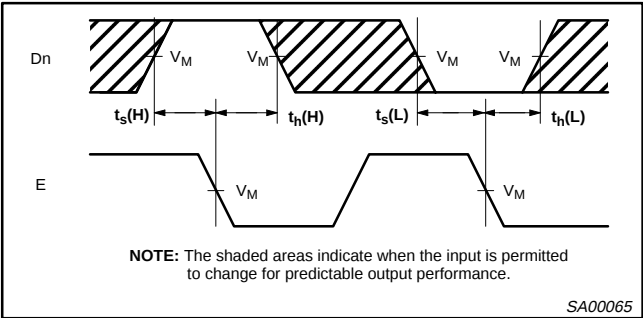
Waveform 4. 3-State Output Enable Time to High Level and Output Disable Time from High Level



Waveform 2. Propagation Delay for Data to Outputs



Waveform 5. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level



Waveform 3. Data Setup and Hold Times

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74ABT573A

TEST CIRCUIT AND WAVEFORM

