

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

SDAS048D – DECEMBER 1989 – REVISED JANUARY 1995

- 3-State Buffer-Type Outputs Drive Bus Lines Directly
- Bus-Structured Pinout
- True Logic Outputs
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), Standard Plastic (N) and Ceramic (J) 300-mil DIPs, and Ceramic Flat (W) Packages

## description

These octal D-type transparent latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

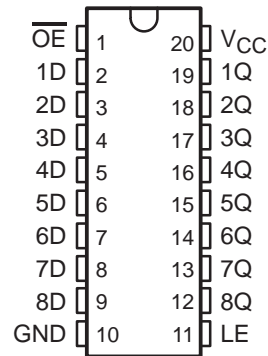
While the latch-enable (LE) input is high, outputs (Q) respond to the data (D) inputs. When LE is low, the outputs are latched to retain the data that was set up.

A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and the increased drive provide the capability to drive bus lines without interface or pullup components.

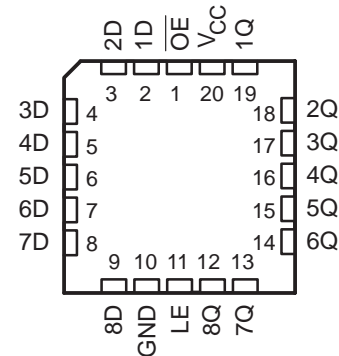
$\overline{OE}$  does not affect internal operation of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54ALS573C and SN54AS573A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS573C and SN74AS573A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS573C, SN54AS573A . . . J OR W PACKAGE  
SN74ALS573C, SN74AS573A . . . DW OR N PACKAGE  
(TOP VIEW)



SN54ALS573C, SN54AS573A . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE  
(each latch)

| INPUTS          |    |   | OUTPUT |
|-----------------|----|---|--------|
| $\overline{OE}$ | LE | D | Q      |
| L               | H  | H | H      |
| L               | H  | L | L      |
| L               | L  | X | $Q_0$  |
| H               | X  | X | Z      |

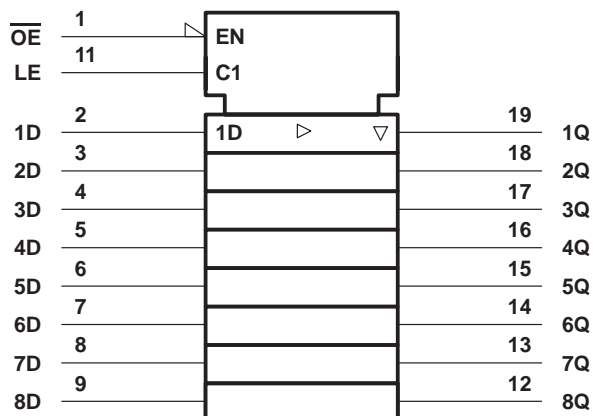
# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A

## OCTAL D-TYPE TRANSPARENT LATCHES

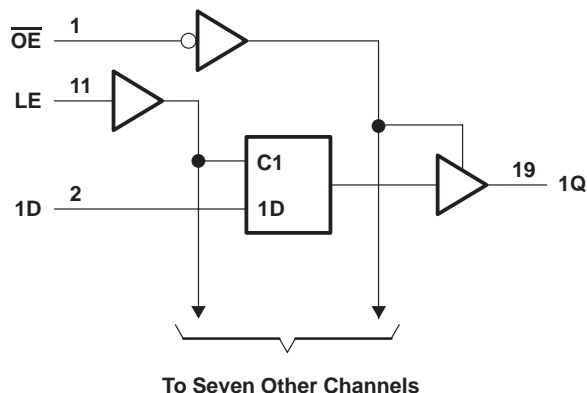
### WITH 3-STATE OUTPUTS

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#### logic symbol†



#### logic diagram (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

|   |                |
|---|----------------|
| Supply voltage, $V_{CC}$                                  | 7 V            |
| Input voltage, $V_I$                                      | 7 V            |
| Voltage applied to a disabled 3-state output              | 5.5 V          |
| Operating free-air temperature range, $T_A$ : SN54ALS573C | -55°C to 125°C |
| SN74ALS573C   | 0°C to 70°C    |
| Storage temperature range                                 | -65°C to 150°C |

‡ Stresses beyond those listed under "absolute maximum ratings" 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.

#### recommended operating conditions

|                                      | SN54ALS573C |     |     | SN74ALS573C |     |      | UNIT |
|--------------------------------------|-------------|-----|-----|-------------|-----|------|------|
|                                      | MIN         | NOM | MAX | MIN         | NOM | MAX  |      |
| $V_{CC}$ Supply voltage              | 4.5         | 5   | 5.5 | 4.5         | 5   | 5.5  | V    |
| $V_{IH}$ High-level input voltage    | 2           |     |     | 2           |     |      | V    |
| $V_{IL}$ Low-level input voltage     |             |     | 0.7 |             |     | 0.8  | V    |
| $I_{OH}$ High-level output current   |             |     | -1  |             |     | -2.6 | mA   |
| $I_{OL}$ Low-level output current    |             |     | 12  |             |     | 24   | mA   |
| $t_w$ Pulse duration, LE high        | 25          |     |     | 10          |     |      | ns   |
| $t_{su}$ Setup time, data before LE↓ | 10          |     |     | 10          |     |      | ns   |
| $t_h$ Hold time, data after LE↓      | 7           |     |     | 7           |     |      | ns   |
| $T_A$ Operating free-air temperature | -55         |     | 125 | 0           |     | 70   | °C   |

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

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**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

| PARAMETER       | TEST CONDITIONS                           |                           | SN54ALS573C  |      | SN74ALS573C  |      | UNIT          |
|-----------------|---|---------------------------|--------------|------|--------------|------|---------------|
|                 |   |                           | MIN          | TYP† | MAX          | MIN  |               |
| $V_{IK}$        | $V_{CC} = 4.5\text{ V}$ ,                 | $I_I = -18\text{ mA}$     | -1.2         |      | -1.2         |      | V             |
| $V_{OH}$        | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , | $I_{OH} = -0.4\text{ mA}$ | $V_{CC} - 2$ |      | $V_{CC} - 2$ |      | V             |
|                 | $V_{CC} = 4.5\text{ V}$                   | $I_{OH} = -1\text{ mA}$   | 2.4          | 3.3  |              |      |               |
| $V_{OL}$        | $V_{CC} = 4.5\text{ V}$                   | $I_{OL} = 12\text{ mA}$   | 0.25         | 0.4  | 0.25         | 0.4  | V             |
|                 |   | $I_{OL} = 24\text{ mA}$   |              |      | 0.35         | 0.5  |               |
| $I_{OZH}$       | $V_{CC} = 5.5\text{ V}$ ,                 | $V_O = 2.7\text{ V}$      | 20           |      | 20           |      | $\mu\text{A}$ |
| $I_{OZL}$       | $V_{CC} = 5.5\text{ V}$ ,                 | $V_O = 0.4\text{ V}$      | -20          |      | -20          |      | $\mu\text{A}$ |
| $I_I$           | $V_{CC} = 5.5\text{ V}$ ,                 | $V_I = 7\text{ V}$        | 0.1          |      | 0.1          |      | mA            |
| $I_{IH}$        | $V_{CC} = 5.5\text{ V}$ ,                 | $V_I = 2.7\text{ V}$      | 20           |      | 20           |      | $\mu\text{A}$ |
| $I_{IL}$        | $V_{CC} = 5.5\text{ V}$ ,                 | $V_I = 0.4\text{ V}$      | -0.13        |      | -0.1         |      | mA            |
| $I_{O\ddagger}$ | $V_{CC} = 5.5\text{ V}$ ,                 | $V_O = 2.25\text{ V}$     | -20          | -112 | -30          | -112 | mA            |
| $I_{CC}$        | $V_{CC} = 5.5\text{ V}$                   | Outputs high              | 10           | 17   | 10           | 17   | mA            |
|                 |   | Outputs low               | 15           | 24   | 15           | 24   |               |
|                 |   | Outputs disabled          | 16           | 27   | 16           | 27   |               |

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## switching characteristics (see Figure 1)

| PARAMETER | FROM (INPUT)    | TO (OUTPUT) | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ ,<br>$C_L = 50\text{ pF}$ ,<br>$R_1 = 500\ \Omega$ ,<br>$R_2 = 500\ \Omega$ ,<br>$T_A = \text{MIN to MAX}\S$ |     |             |     | UNIT |
|-----------|-----------------|-------------|--|-----|-------------|-----|------|
|           |                 |             | SN54ALS573C  |     | SN74ALS573C |     |      |
|           |                 |             | MIN  | MAX | MIN         | MAX |      |
| $t_{PLH}$ | D               | Q           | 2  | 20  | 2           | 14  | ns   |
| $t_{PHL}$ |                 |             | 2  | 17  | 2           | 14  |      |
| $t_{PLH}$ | LE              | Q           | 8  | 33  | 6           | 20  | ns   |
| $t_{PHL}$ |                 |             | 8  | 24  | 6           | 19  |      |
| $t_{PZH}$ | $\overline{OE}$ | Q           | 4  | 28  | 3           | 18  | ns   |
| $t_{PZL}$ |                 |             | 4  | 21  | 4           | 18  |      |
| $t_{PHZ}$ | $\overline{OE}$ | Q           | 2  | 20  | 1           | 10  | ns   |
| $t_{PLZ}$ |                 |             | 3  | 26  | 1           | 15  |      |

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.



# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A

## OCTAL D-TYPE TRANSPARENT LATCHES

### WITH 3-STATE OUTPUTS

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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

|  |                |
|--|----------------|
| Supply voltage, $V_{CC}$                                 | 7 V            |
| Input voltage, $V_I$                                     | 7 V            |
| Voltage applied to a disabled 3-state output             | 5.5 V          |
| Operating free-air temperature range, $T_A$ : SN54AS573A | –55°C to 125°C |
| SN74AS573A   | 0°C to 70°C    |
| Storage temperature range                                | –65°C to 150°C |

† Stresses beyond those listed under “absolute maximum ratings” 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.

#### recommended operating conditions

|            |                                | SN54AS573A |     |     | SN74AS573A |     |     | UNIT |
|------------|--------------------------------|------------|-----|-----|------------|-----|-----|------|
|            |                                | MIN        | NOM | MAX | MIN        | NOM | MAX |      |
| $V_{CC}$   | Supply voltage                 | 4.5        | 5   | 5.5 | 4.5        | 5   | 5.5 | V    |
| $V_{IH}$   | High-level input voltage       | 2          |     |     | 2          |     |     | V    |
| $V_{IL}$   | Low-level input voltage        |            |     | 0.8 |            |     | 0.8 | V    |
| $I_{OH}$   | High-level output current      |            |     | –12 |            |     | –15 | mA   |
| $I_{OL}$   | Low-level output current       |            |     | 32  |            |     | 48  | mA   |
| $t_w^*$    | Pulse duration, LE high        | 5.5        |     |     | 4.5        |     |     | ns   |
| $t_{su}^*$ | Setup time, data before LE↓    | 2          |     |     | 2          |     |     | ns   |
| $t_h^*$    | Hold time, data after LE↓      | 3          |     |     | 3          |     |     | ns   |
| $T_A$      | Operating free-air temperature | –55        |     | 125 | 0          |     | 70  | °C   |

\* On products compliant to MIL-STD-883, Class B, this parameter is based on characterization data but is not production tested.

#### electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS                             | SN54AS573A   |      |      | SN74AS573A   |      |      | UNIT |
|-----------|---|--------------|------|------|--------------|------|------|------|
|           |   | MIN          | TYP‡ | MAX  | MIN          | TYP‡ | MAX  |      |
| $V_{IK}$  | $V_{CC} = 4.5$ V, $I_I = -18$ mA            |              |      | –1.2 |              |      | –1.2 | V    |
| $V_{OH}$  | $V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA | $V_{CC} - 2$ |      |      | $V_{CC} - 2$ |      |      | V    |
|           | $V_{CC} = 4.5$ V, $I_{OH} = -12$ mA         | 2.4          | 3.2  |      | 2.4          | 3.3  |      |      |
|           | $V_{CC} = 4.5$ V, $I_{OH} = -15$ mA         |              |      |      |              |      |      |      |
| $V_{OL}$  | $V_{CC} = 4.5$ V, $I_{OL} = 32$ mA          |              | 0.28 | 0.5  |              |      |      | V    |
|           | $V_{CC} = 4.5$ V, $I_{OL} = 48$ mA          |              |      |      |              | 0.33 | 0.5  |      |
| $I_{OZH}$ | $V_{CC} = 5.5$ V, $V_O = 2.7$ V             |              |      | 50   |              |      | 50   | μA   |
| $I_{OZL}$ | $V_{CC} = 5.5$ V, $V_O = 0.4$ V             |              |      | –50  |              |      | –50  | μA   |
| $I_I$     | $V_{CC} = 5.5$ V, $V_I = 7$ V               |              |      | 0.1  |              |      | 0.1  | mA   |
| $I_{IH}$  | $V_{CC} = 5.5$ V, $V_I = 2.7$ V             |              |      | 20   |              |      | 20   | μA   |
| $I_{IL}$  | $V_{CC} = 5.5$ V, $V_I = 0.4$ V             |              |      | –0.1 |              |      | –0.5 | mA   |
| $I_{O§}$  | $V_{CC} = 5.5$ V, $V_O = 2.25$ V            | –30          |      | –112 | –30          |      | –112 | mA   |
| $I_{CC}$  | $V_{CC} = 5.5$ V, Outputs high              |              | 56   | 93   |              | 56   | 93   | mA   |
|           | $V_{CC} = 5.5$ V, Outputs low               |              | 55   | 90   |              | 55   | 90   |      |
|           | $V_{CC} = 5.5$ V, Outputs disabled          |              | 65   | 106  |              | 65   | 106  |      |

‡ All typical values are at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$ .

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .



**SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A**  
**OCTAL D-TYPE TRANSPARENT LATCHES**  
**WITH 3-STATE OUTPUTS**

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**switching characteristics (see Figure 1)**

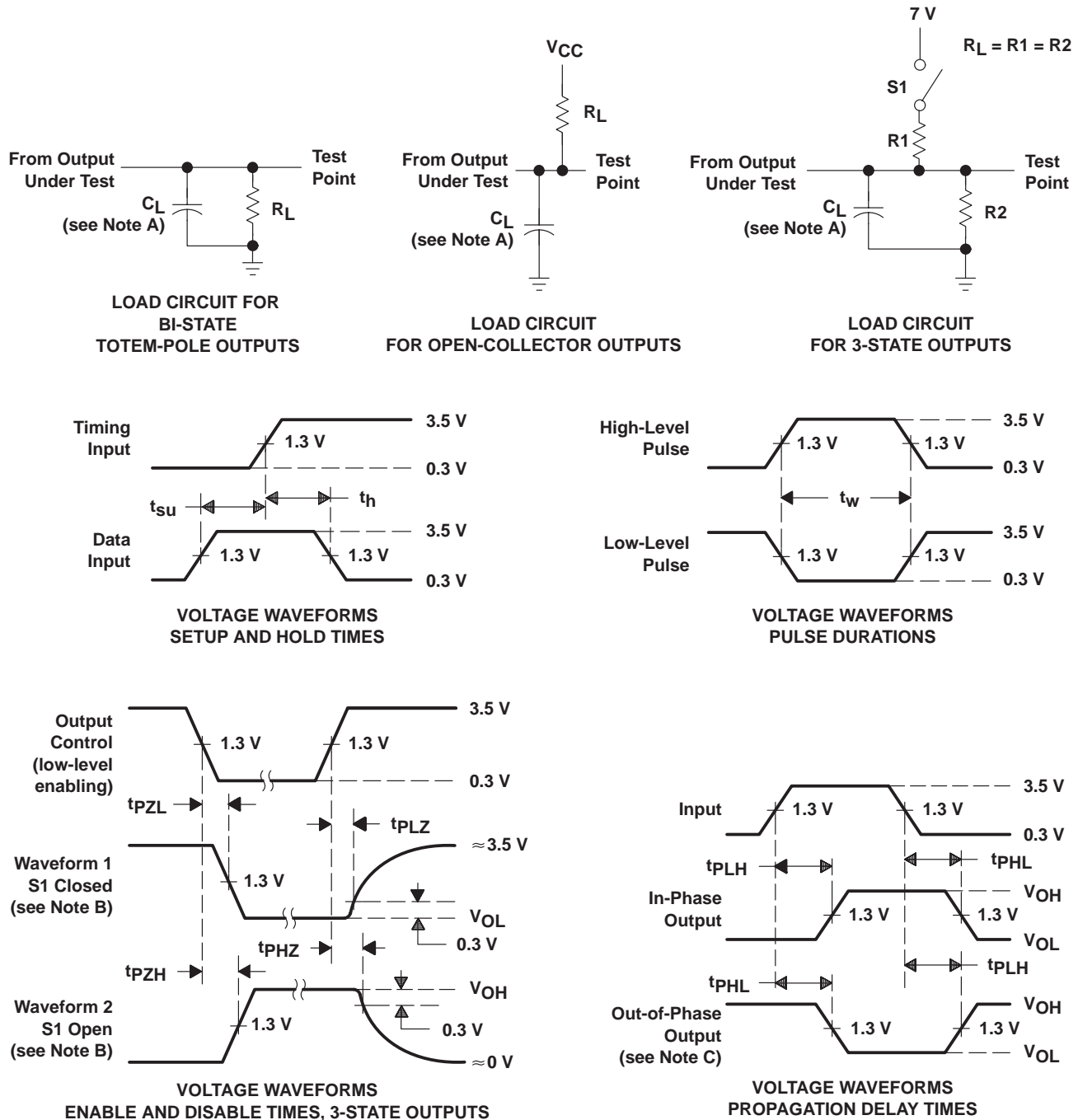
| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ ,<br>$C_L = 50 \text{ pF}$ ,<br>$R_1 = 500 \Omega$ ,<br>$R_2 = 500 \Omega$ ,<br>$T_A = \text{MIN to MAX}^\dagger$ |      |            |     | UNIT |
|-----------|-----------------|----------------|--|------|------------|-----|------|
|           |                 |                | SN54AS573A   |      | SN74AS573A |     |      |
|           |                 |                | MIN  | MAX  | MIN        | MAX |      |
| $t_{PLH}$ | D               | Q              | 3  | 11   | 3          | 8   | ns   |
| $t_{PHL}$ |                 |                | 3  | 8    | 3          | 7   |      |
| $t_{PLH}$ | LE              | Q              | 6  | 16.5 | 6          | 13  | ns   |
| $t_{PHL}$ |                 |                | 4  | 9    | 4          | 7.5 |      |
| $t_{PZH}$ | $\overline{OE}$ | Q              | 2  | 8    | 2          | 6.5 | ns   |
| $t_{PZL}$ |                 |                | 4  | 11   | 4          | 9.5 |      |
| $t_{PHZ}$ | $\overline{OE}$ | Q              | 2  | 8    | 2          | 6.5 | ns   |
| $t_{PLZ}$ |                 |                | 2  | 8    | 2          | 7   |      |

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

# SN54ALS573C, SN54AS573A, SN74ALS573C, SN74AS573A OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

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## PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms



**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup>               |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| 84012012A        | ACTIVE                | LCCC         | FK              | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| 8401201RA        | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| 8401201SA        | ACTIVE                | CFP          | W               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| JM38510/38201B2A | ACTIVE                | LCCC         | FK              | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| JM38510/38201BRA | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SN54ALS573CJ     | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SN54AS573AJ      | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SN74ALS573CDBLE  | OBSOLETE              | SSOP         | DB              | 20   |             | None                    | Call TI          | Call TI                                    |
| SN74ALS573CDBR   | ACTIVE                | SSOP         | DB              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74ALS573CDW    | ACTIVE                | SOIC         | DW              | 20   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74ALS573CDWR   | ACTIVE                | SOIC         | DW              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74ALS573CN     | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | Level-NC-NC-NC                             |
| SN74ALS573CN3    | OBSOLETE              | PDIP         | N               | 20   |             | None                    | Call TI          | Call TI                                    |
| SN74ALS573CNSR   | ACTIVE                | SO           | NS              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74AS573ADW     | ACTIVE                | SOIC         | DW              | 20   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74AS573ADWR    | ACTIVE                | SOIC         | DW              | 20   | 2000        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-250C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN74AS573AN      | ACTIVE                | PDIP         | N               | 20   | 20          | Pb-Free (RoHS)          | CU NIPDAU        | Level-NC-NC-NC                             |
| SN74AS573AN3     | OBSOLETE              | PDIP         | N               | 20   |             | None                    | Call TI          | Call TI                                    |
| SNJ54ALS573CFK   | ACTIVE                | LCCC         | FK              | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SNJ54ALS573CJ    | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SNJ54ALS573CW    | ACTIVE                | CFP          | W               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |
| SNJ54AS573AFK    | OBSOLETE              | LCCC         | FK              | 20   |             | None                    | Call TI          | Call TI                                    |
| SNJ54AS573AJ     | ACTIVE                | CDIP         | J               | 20   | 1           | None                    | Call TI          | Level-NC-NC-NC                             |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**None:** Not yet available Lead (Pb-Free).

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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