

# SN54ALS157A, SN54ALS158 SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158 QUADRUPLE 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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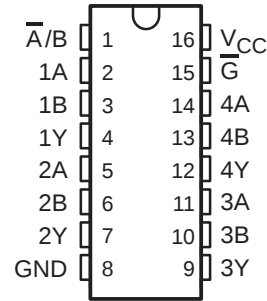
- Buffered Inputs and Outputs
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

## description

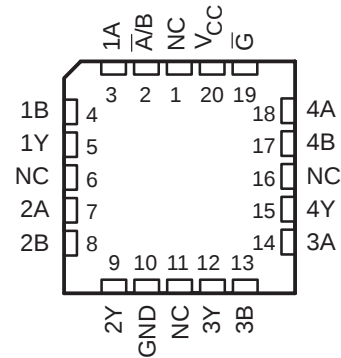
These data selectors/multiplexers contain inverters and drivers to supply full data selection to the four output gates. A separate strobe ( $\overline{G}$ ) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'ALS157A and SN74AS157 present true data. The 'ALS158 and SN74AS158 present inverted data to minimize propagation delay time.

The SN54ALS157A and SN54ALS158 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS157A, SN74ALS158, SN74AS157, and SN74AS158 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS157A, SN54ALS158 . . . J PACKAGE  
SN74ALS157A, SN74ALS158,  
SN74AS157, SN74AS158 . . . D OR N PACKAGE  
(TOP VIEW)



SN54ALS157A, SN54ALS158 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

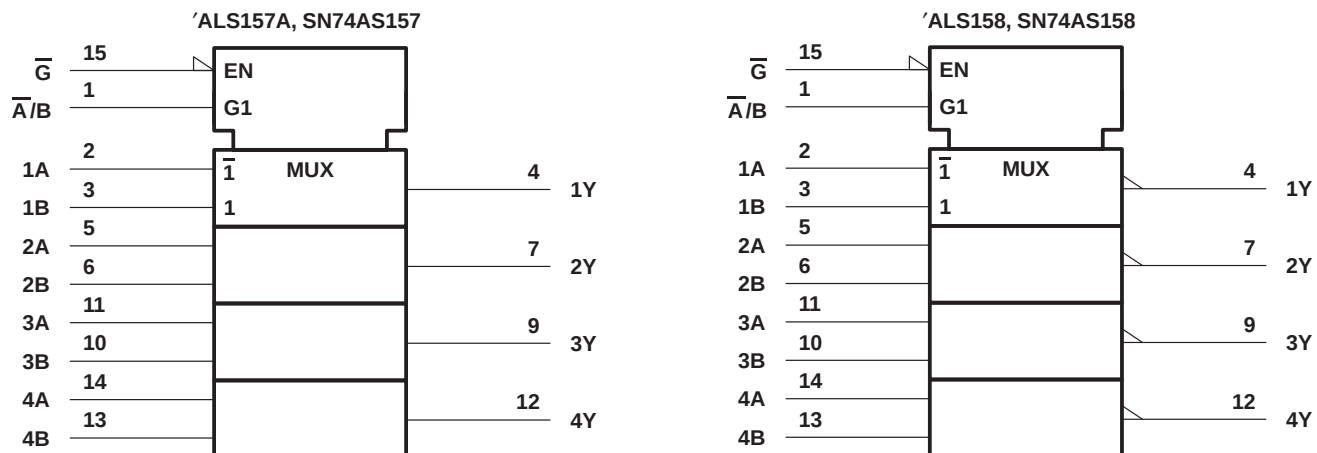
FUNCTION TABLE

| INPUTS         |                  |      |   | OUTPUT Y              |                      |
|----------------|------------------|------|---|-----------------------|----------------------|
| $\overline{G}$ | $\overline{A/B}$ | DATA |   | 'ALS157A<br>SN74AS157 | 'ALS158<br>SN74AS158 |
|                |                  | A    | B |                       |                      |
| H              | X                | X    | X | L                     | H                    |
| L              | L                | L    | X | L                     | H                    |
| L              | L                | H    | X | H                     | L                    |
| L              | H                | X    | L | L                     | H                    |
| L              | H                | X    | H | H                     | L                    |

# SN54ALS157A, SN54ALS158 SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158 QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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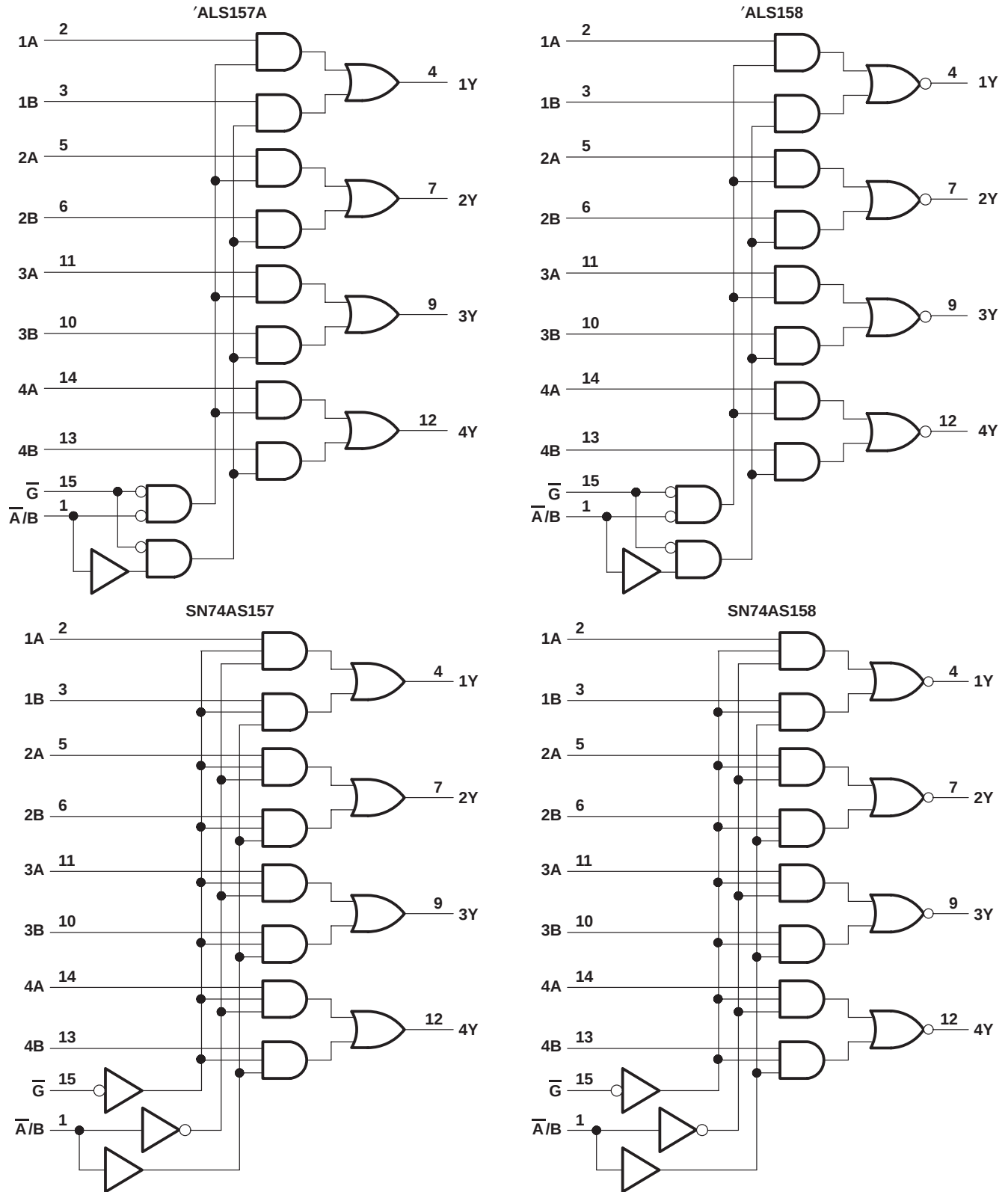
## logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for the D, J, and N packages.

SN54ALS157A, SN54ALS158  
SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158  
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logic diagrams (positive logic)



Pin numbers shown are for the D, J, and N packages.

# SN54ALS157A, SN54ALS158 SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158 QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS

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

|                                                                       |                |
|-----------------------------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$                                              | 7 V            |
| Input voltage, $V_I$                                                  | 7 V            |
| Operating free-air temperature range, $T_A$ : SN54ALS157A, SN54ALS158 | –55°C to 125°C |
| SN74ALS157A, SN74ALS158                                               | 0°C to 70°C    |
| Storage temperature range                                             | –65°C to 150°C |

<sup>†</sup> 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

|          |                                | SN54ALS157A<br>SN54ALS158 |     |      | SN74ALS157A<br>SN74ALS158 |     |      | 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      |                           |     | –0.4 |                           |     | –0.4 | mA   |
| $I_{OL}$ | Low-level output current       |                           |     | 4    |                           |     | 8    | mA   |
| $T_A$    | Operating free-air temperature | –55                       |     | 125  | 0                         |     | 70   | °C   |

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

| PARAMETER                   |          | TEST CONDITIONS                                             |                        | SN54ALS157A<br>SN54ALS158 |                  |      | SN74ALS157A<br>SN74ALS158 |                  |     | UNIT |
|-----------------------------|----------|-------------------------------------------------------------|------------------------|---------------------------|------------------|------|---------------------------|------------------|-----|------|
|                             |          |                                                             |                        | MIN                       | TYP <sup>‡</sup> | MAX  | MIN                       | TYP <sup>‡</sup> | MAX |      |
| V <sub>IK</sub>             |          | V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = −18 mA            |                        | −1.2                      |                  |      | −1.2                      |                  |     | V    |
| V <sub>OH</sub>             |          | V <sub>CC</sub> = 4.5 V to 5.5 V, I <sub>OH</sub> = −0.4 mA |                        | V <sub>CC</sub> − 2       |                  |      | V <sub>CC</sub> − 2       |                  |     | V    |
| V <sub>OL</sub>             |          | V <sub>CC</sub> = 4.5 V                                     | I <sub>OL</sub> = 4 mA | 0.25                      | 0.4              | 0.25 | 0.4                       | V                |     |      |
|                             |          |                                                             | I <sub>OL</sub> = 8 mA |                           |                  | 0.35 | 0.5                       |                  |     |      |
| I <sub>I</sub>              |          | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V               | 0.1                    |                           |                  | 0.1  |                           |                  | mA  |      |
| I <sub>IH</sub>             |          | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V             | 20                     |                           |                  | 20   |                           |                  | μA  |      |
| I <sub>IL</sub>             |          | V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.4 V             | −0.1                   |                           |                  | −0.1 |                           |                  | mA  |      |
| I <sub>O</sub> <sup>§</sup> |          | V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.25 V            | −20                    | −112                      | −30              | −112 | mA                        |                  |     |      |
| I <sub>CC</sub>             | 'ALS157A | V <sub>CC</sub> = 5.5 V, See Note 1                         | 6                      | 11                        | 6                | 11   | mA                        |                  |     |      |
|                             | 'ALS158  |                                                             | 5                      | 10                        | 5                | 10   |                           |                  |     |      |

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

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

NOTE 1:  $I_{CC}$  is measured with 4.5 V applied to all inputs and all outputs open.



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SN54ALS157A, SN54ALS158  
SN74ALS157A, SN74ALS158, SN74ALS157, SN74ALS158  
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switching characteristics (see Figure 1)

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 5\text{ V}$ ,<br>$C_L = 50\text{ pF}$ ,<br>$R_L = 500\ \Omega$ ,<br>$T_A = 25^\circ\text{C}$ | $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ ,<br>$C_L = 50\text{ pF}$ ,<br>$R_L = 500\ \Omega$ ,<br>$T_A = \text{MIN to MAX}^\dagger$ |     |             |     | UNIT |
|-----------|-----------------|----------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----|-------------|-----|------|
|           |                 |                | 'ALS157A                                                                                               | SN54ALS157A                                                                                                                        |     | SN74ALS157A |     |      |
|           |                 |                | TYP                                                                                                    | MIN                                                                                                                                | MAX | MIN         | MAX |      |
| $t_{PLH}$ | A or B          | Y              | 9                                                                                                      | 4                                                                                                                                  | 17  | 4           | 14  | ns   |
| $t_{PHL}$ |                 |                | 6                                                                                                      | 2                                                                                                                                  | 15  | 2           | 12  |      |
| $t_{PLH}$ | $\bar{A}/B$     | Y              | 15                                                                                                     | 7                                                                                                                                  | 28  | 7           | 24  | ns   |
| $t_{PHL}$ |                 |                | 9                                                                                                      | 4                                                                                                                                  | 20  | 4           | 17  |      |
| $t_{PLH}$ | $\bar{G}$       | Y              | 14                                                                                                     | 7                                                                                                                                  | 25  | 7           | 20  | ns   |
| $t_{PHL}$ |                 |                | 10                                                                                                     | 4                                                                                                                                  | 18  | 4           | 13  |      |

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

switching characteristics (see Figure 1)

| PARAMETER | FROM<br>(INPUT)  | TO<br>(OUTPUT) | $V_{CC} = 5\text{ V}$ ,<br>$C_L = 50\text{ pF}$ ,<br>$R_L = 500\ \Omega$ ,<br>$T_A = 25^\circ\text{C}$ | $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ ,<br>$C_L = 50\text{ pF}$ ,<br>$R_L = 500\ \Omega$ ,<br>$T_A = \text{MIN to MAX}^\dagger$ |     |            |     | UNIT |
|-----------|------------------|----------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----|------------|-----|------|
|           |                  |                | 'ALS158                                                                                                | SN54ALS158                                                                                                                         |     | SN74ALS158 |     |      |
|           |                  |                | TYP                                                                                                    | MIN                                                                                                                                | MAX | MIN        | MAX |      |
| $t_{PLH}$ | A or B           | Y              | 9                                                                                                      | 4                                                                                                                                  | 18  | 4          | 15  | ns   |
| $t_{PHL}$ |                  |                | 5                                                                                                      | 2                                                                                                                                  | 12  | 2          | 8   |      |
| $t_{PLH}$ | $\overline{A}/B$ | Y              | 13                                                                                                     | 5                                                                                                                                  | 22  | 5          | 18  | ns   |
| $t_{PHL}$ |                  |                | 13                                                                                                     | 5                                                                                                                                  | 22  | 5          | 18  |      |
| $t_{PLH}$ | $\overline{G}$   | Y              | 13                                                                                                     | 5                                                                                                                                  | 22  | 5          | 18  | ns   |
| $t_{PHL}$ |                  |                | 13                                                                                                     | 5                                                                                                                                  | 22  | 5          | 18  |      |

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

**SN54ALS157A, SN54ALS158**  
**SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158**  
**QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS**

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**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>**

|                                                                    |                |
|--------------------------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$                                           | 7 V            |
| Input voltage, $V_I$                                               | 7 V            |
| Operating free-air temperature range, $T_A$ : SN74AS157, SN74AS158 | 0°C to 70°C    |
| Storage temperature range                                          | –65°C to 150°C |

<sup>†</sup> 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**

|          |                                | SN74AS157<br>SN74AS158 |     |     | UNIT |
|----------|--------------------------------|------------------------|-----|-----|------|
|          |                                | MIN                    | NOM | MAX |      |
| $V_{CC}$ | Supply voltage                 | 4.5                    | 5   | 5.5 | V    |
| $V_{IH}$ | High-level input voltage       | 2                      |     |     | V    |
| $V_{IL}$ | Low-level input voltage        |                        |     | 0.8 | V    |
| $I_{OH}$ | High-level output current      |                        |     | –2  | mA   |
| $I_{OL}$ | Low-level output current       |                        |     | 20  | mA   |
| $T_A$    | Operating free-air temperature | 0                      |     | 70  | °C   |

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

| PARAMETER    |                         | TEST CONDITIONS                                                    | SN74AS157<br>SN74AS158 |                  |      | UNIT |
|--------------|-------------------------|--------------------------------------------------------------------|------------------------|------------------|------|------|
|              |                         |                                                                    | MIN                    | TYP <sup>‡</sup> | MAX  |      |
| $V_{IK}$     |                         | $V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$                    |                        |                  | –1.2 | V    |
| $V_{OH}$     |                         | $V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ , $I_{OH} = -2\text{ mA}$ | $V_{CC} - 2$           |                  |      | V    |
| $V_{OL}$     |                         | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 20\text{ mA}$                  |                        | 0.35             | 0.5  | V    |
| $I_I$        | $\overline{A}/B$        | $V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$                       |                        |                  | 0.2  | mA   |
|              | A, B, or $\overline{G}$ |                                                                    |                        |                  | 0.1  |      |
| $I_{IH}$     | $\overline{A}/B$        | $V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$                     |                        |                  | 40   | μA   |
|              | A, B, or $\overline{G}$ |                                                                    |                        |                  | 20   |      |
| $I_{IL}$     | $\overline{A}/B$        | $V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$                     |                        |                  | –1   | mA   |
|              | A, B, or $\overline{G}$ |                                                                    |                        |                  | –0.5 |      |
| $I_{O}^{\S}$ |                         | $V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$                    | –30                    |                  | –112 | mA   |
| $I_{CC}$     | SN74AS157               | $V_{CC} = 5.5\text{ V}$                                            |                        |                  | 17.5 | mA   |
|              | SN74AS158               |                                                                    |                        |                  | 15.6 |      |

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

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



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switching characteristics (see Figure 1)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω,<br>T <sub>A</sub> = MIN to MAX† |      | UNIT |
|------------------|-----------------|----------------|-------------------------------------------------------------------------------------------------------------------------|------|------|
|                  |                 |                | SN74AS157                                                                                                               |      |      |
|                  |                 |                | MIN                                                                                                                     | MAX  |      |
| t <sub>PLH</sub> | A or B          | Y              | 1                                                                                                                       | 6    | ns   |
| t <sub>PHL</sub> |                 |                | 1                                                                                                                       | 5.5  |      |
| t <sub>PLH</sub> | $\bar{A}/B$     | Y              | 2                                                                                                                       | 11   | ns   |
| t <sub>PHL</sub> |                 |                | 2                                                                                                                       | 10   |      |
| t <sub>PLH</sub> | $\bar{G}$       | Y              | 2                                                                                                                       | 10.5 | ns   |
| t <sub>PHL</sub> |                 |                | 2                                                                                                                       | 7.5  |      |

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

switching characteristics (see Figure 1)

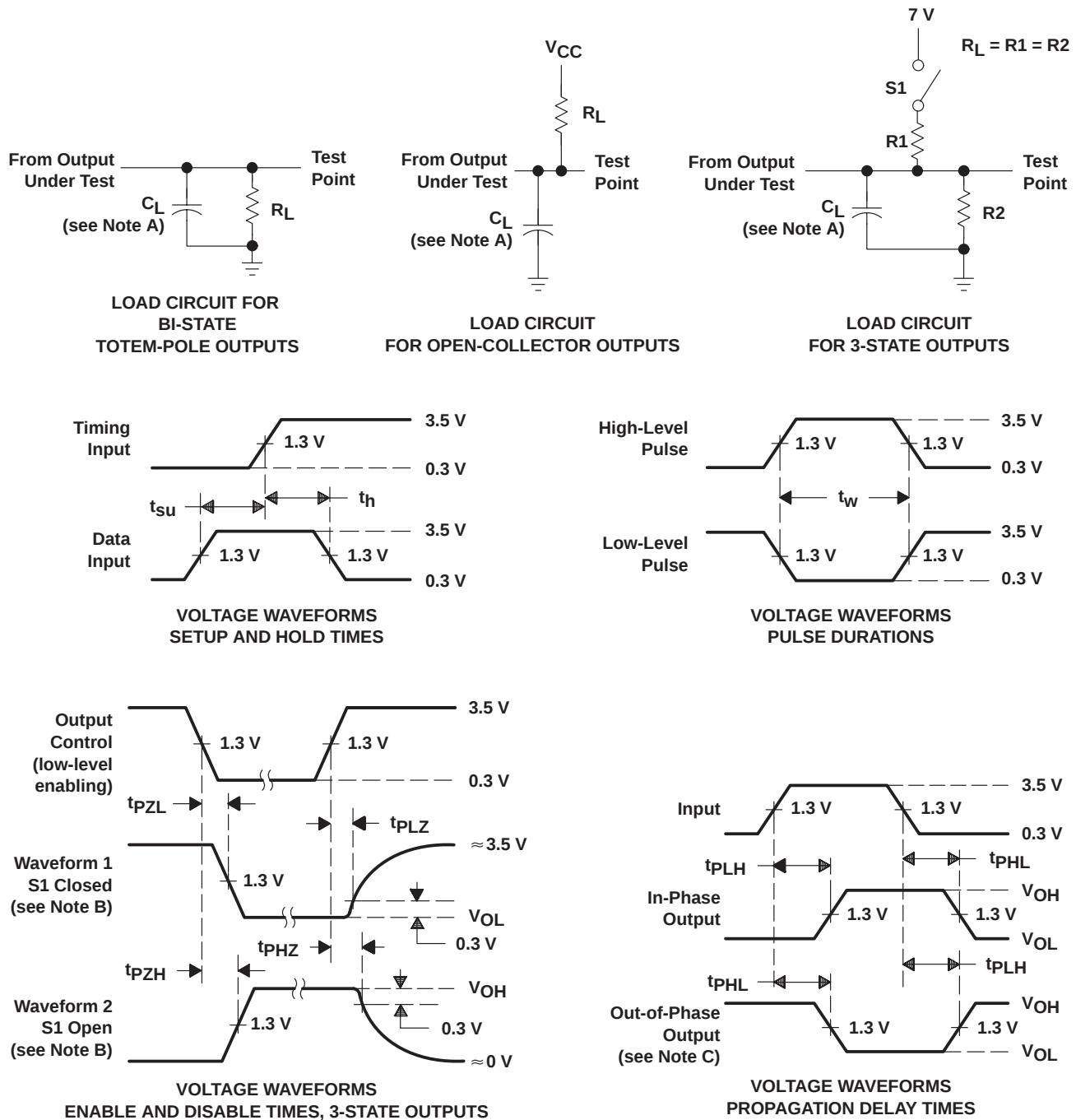
| PARAMETER | FROM<br>(INPUT)  | TO<br>(OUTPUT) | VCC = 4.5 V to 5.5 V,<br>CL = 50 pF,<br>RL = 500 Ω,<br>TA = MIN to MAX† |      | UNIT |
|-----------|------------------|----------------|-------------------------------------------------------------------------|------|------|
|           |                  |                | SN74AS158                                                               |      |      |
|           |                  |                | MIN                                                                     | MAX  |      |
| tPLH      | A or B           | Y              | 1                                                                       | 5    | ns   |
| tPHL      |                  |                | 1                                                                       | 4.5  |      |
| tPLH      | $\overline{A}/B$ | Y              | 2                                                                       | 9.5  | ns   |
| tPHL      |                  |                | 2                                                                       | 10.5 |      |
| tPLH      | $\overline{G}$   | Y              | 2                                                                       | 6.5  | ns   |
| tPHL      |                  |                | 2                                                                       | 10   |      |

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

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**SN74ALS157A, SN74ALS158, SN74AS157, SN74AS158**  
**QUAD 1-OF-2 DATA SELECTORS/MULTIPLEXERS**

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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**

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