

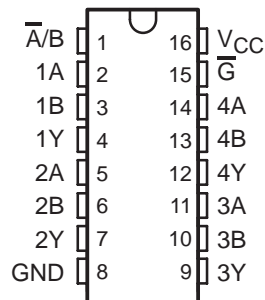
SN54LV157A, SN74LV157A

QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

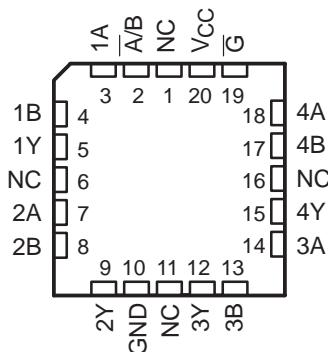
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- 2-V to 5.5-V V_{CC} Operation
- Max t_{pd} of 7.5 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at V_{CC} , $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at V_{CC} , $T_A = 25^\circ\text{C}$
- I_{off} Supports Partial-Power-Down-Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

SN54LV157A . . . J OR W PACKAGE
SN74LV157A . . . D, DB, DGV, NS, OR PW PACKAGE
(TOP VIEW)



SN54LV157A . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The 'LV157A devices are quadruple 2-line to 1-line data selectors/multiplexers designed for 2-V to 5.5-V V_{CC} operation.

These devices contain inverters and drivers to supply full data selection to the four output gates. A separate strobe (\bar{G}) input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The 'LV157A devices present true data.

ORDERING INFORMATION

| T_A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-------------|---------------|-----------------------|------------------|
| –40°C to 85°C | SOIC – D | Tube of 40 | SN74LV157AD | LV157A |
| | | Reel of 2500 | SN74LV157ADR | |
| | SOP – NS | Reel of 2000 | SN74LV157ANSR | 74LV157A |
| | SSOP – DB | Reel of 2000 | SN74LV157ADBR | LV157A |
| | TSSOP – PW | Tube of 90 | SN74LV157APW | LV157A |
| | | Reel of 2000 | SN74LV157APWR | |
| Reel of 250 | | SN74LV157APWT | | |
| | TVSOP – DGV | Reel of 2000 | SN74LV157ADGVR | LV157A |
| –55°C to 125°C | CDIP – J | Tube of 25 | SNJ54LV157AJ | SNJ54LV157AJ |
| | CFP – W | Tube of 150 | SNJ54LV157AW | SNJ54LV157AW |
| | LCCC – FK | Tube of 55 | SNJ54LV157AFK | SNJ54LV157AFK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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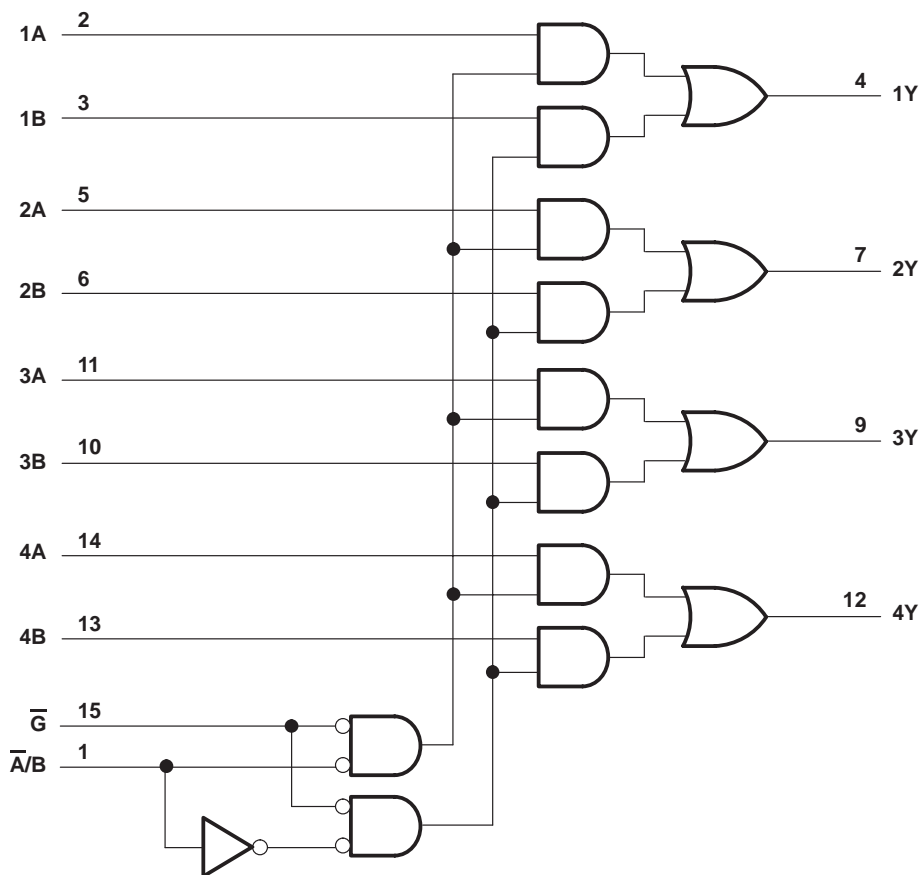
description/ordering information (continued)

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

FUNCTION TABLE

| INPUTS | | | | | OUTPUT Y |
|-----------|-----------------------|------|---|---|-------------|
| \bar{G} | SELECT \bar{A}/B | DATA | | | |
| | | A | B | | |
| H | X | X | X | L | |
| L | L | L | X | L | |
| L | L | H | X | H | |
| L | H | X | L | L | |
| L | H | X | H | H | |

logic diagram (positive logic)



Pin numbers shown are for the D, DB, DGV, J, NS, PW, and W packages.

SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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

| | |
|--|----------------------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input voltage range, V_I (see Note 1) | –0.5 V to 7 V |
| Output voltage range applied in high or low state, V_O (see Notes 1 and 2) | –0.5 V to $V_{CC} + 0.5$ V |
| Output voltage range applied in power-off state, V_O (see Note 1) | –0.5 V to 7 V |
| Input clamp current, I_{IK} ($V_I < 0$) | –20 mA |
| Output clamp current, I_{OK} ($V_O < 0$) | –50 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ±25 mA |
| Continuous current through V_{CC} or GND | ±50 mA |
| Package thermal impedance, θ_{JA} (see Note 3): | |
| D package | 73°C/W |
| DB package | 82°C/W |
| DGV package | 120°C/W |
| NS package | 64°C/W |
| PW package | 108°C/W |
| Storage temperature range, T_{stg} | –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.

- NOTES:
1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 2. This value is limited to 5.5 V maximum.
 3. The package thermal impedance is calculated in accordance with JESD 51-7.

SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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recommended operating conditions (see Note 4)

| | | SN54LV157A | | SN74LV157A | | UNIT |
|-----------------|------------------------------------|----------------------------------|-----------------------|-----------------------|-----------------|------|
| | | MIN | MAX | MIN | MAX | |
| V _{CC} | Supply voltage | 2 | 5.5 | 2 | 5.5 | V |
| V _{IH} | High-level input voltage | V _{CC} = 2 V | 1.5 | 1.5 | | V |
| | | V _{CC} = 2.3 V to 2.7 V | V _{CC} × 0.7 | V _{CC} × 0.7 | | |
| | | V _{CC} = 3 V to 3.6 V | V _{CC} × 0.7 | V _{CC} × 0.7 | | |
| | | V _{CC} = 4.5 V to 5.5 V | V _{CC} × 0.7 | V _{CC} × 0.7 | | |
| V _{IL} | Low-level input voltage | V _{CC} = 2 V | 0.5 | 0.5 | | V |
| | | V _{CC} = 2.3 V to 2.7 V | V _{CC} × 0.3 | V _{CC} × 0.3 | | |
| | | V _{CC} = 3 V to 3.6 V | V _{CC} × 0.3 | V _{CC} × 0.3 | | |
| | | V _{CC} = 4.5 V to 5.5 V | V _{CC} × 0.3 | V _{CC} × 0.3 | | |
| V _I | Input voltage | 0 | 5.5 | 0 | 5.5 | V |
| V _O | Output voltage | 0 | V _{CC} | 0 | V _{CC} | V |
| I _{OH} | High-level output current | V _{CC} = 2 V | -50 | -50 | | μA |
| | | V _{CC} = 2.3 V to 2.7 V | -2 | -2 | | |
| | | V _{CC} = 3 V to 3.6 V | -6 | -6 | mA | |
| | | V _{CC} = 4.5 V to 5.5 V | -12 | -12 | | |
| I _{OL} | Low-level output current | V _{CC} = 2 V | 50 | 50 | μA | |
| | | V _{CC} = 2.3 V to 2.7 V | 2 | 2 | | |
| | | V _{CC} = 3 V to 3.6 V | 6 | 6 | mA | |
| | | V _{CC} = 4.5 V to 5.5 V | 12 | 12 | | |
| Δt/Δv | Input transition rise or fall rate | V _{CC} = 2.3 V to 2.7 V | 200 | 0 | 200 | ns/V |
| | | V _{CC} = 3 V to 3.6 V | 100 | 0 | 100 | |
| | | V _{CC} = 4.5 V to 5.5 V | 20 | 0 | 20 | |
| T _A | Operating free-air temperature | -55 | 125 | -40 | 85 | °C |

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

| PARAMETER | TEST CONDITIONS | V _{CC} | SN54LV157A | | | SN74LV157A | | | UNIT |
|------------------|---|-----------------|----------------------|-----|-----|----------------------|-----|-----|------|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| V _{OH} | I _{OH} = -50 μA | 2 V to 5.5 V | V _{CC} -0.1 | | | V _{CC} -0.1 | | | V |
| | I _{OH} = -2 mA | 2.3 V | 2 | | | 2 | | | |
| | I _{OH} = -6 mA | 3 V | 2.48 | | | 2.48 | | | |
| | I _{OH} = -12 mA | 4.5 V | 3.8 | | | 3.8 | | | |
| V _{OL} | I _{OL} = 50 μA | 2 V to 5.5 V | 0.1 | | | 0.1 | | | V |
| | I _{OL} = 2 mA | 2.3 V | 0.4 | | | 0.4 | | | |
| | I _{OL} = 6 mA | 3 V | 0.44 | | | 0.44 | | | |
| | I _{OL} = 12 mA | 4.5 V | 0.55 | | | 0.55 | | | |
| I _I | V _I = 5.5 V or GND | 0 to 5.5 V | ±1 | | | ±1 | | | μA |
| I _{CC} | V _I = V _{CC} or GND, I _O = 0 | 5.5 V | 20 | | | 20 | | | μA |
| I _{off} | V _I or V _O = 0 to 5.5 V | 0 | 5 | | | 5 | | | μA |
| C _i | V _I = V _{CC} or GND | 3.3 V | 1.7 | | | 1.7 | | | pF |

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SN54LV157A, SN74LV157A QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

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**switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see Figure 1)**

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ\text{C}$ | | | SN54LV157A | | SN74LV157A | | UNIT |
|-----------|------------------|-------------|----------------------|--------------------------|-------|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B | Y | $C_L = 15\text{ pF}$ | 7.4* | 15.9* | 1* | 19.5* | 1 | 19.5 | ns | |
| | $\overline{A/B}$ | Y | | 7.9* | 19.4* | 1* | 23.5* | 1 | 23.5 | | |
| | \overline{G} | Y | | 7.8* | 19.8* | 1* | 24* | 1 | 24 | | |
| t_{pd} | A or B | Y | $C_L = 50\text{ pF}$ | 9.4 | 18.8 | 1 | 22 | 1 | 22 | ns | |
| | $\overline{A/B}$ | Y | | 10.8 | 22.3 | 1 | 26 | 1 | 26 | | |
| | \overline{G} | Y | | 9.6 | 22.7 | 1 | 26.5 | 1 | 26.5 | | |

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

**switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)**

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ\text{C}$ | | | SN54LV157A | | SN74LV157A | | UNIT |
|-----------|------------------|-------------|----------------------|--------------------------|-------|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B | Y | $C_L = 15\text{ pF}$ | 5.2* | 9.7* | 1* | 11.5* | 1 | 11.5 | ns | |
| | $\overline{A/B}$ | Y | | 5.8* | 13.2* | 1* | 15.5* | 1 | 15.5 | | |
| | \overline{G} | Y | | 5.5* | 13.6* | 1* | 16* | 1 | 16 | | |
| t_{pd} | A or B | Y | $C_L = 50\text{ pF}$ | 6.7 | 13.2 | 1 | 15 | 1 | 15 | ns | |
| | $\overline{A/B}$ | Y | | 7.6 | 16.7 | 1 | 19 | 1 | 19 | | |
| | \overline{G} | Y | | 7 | 17.1 | 1 | 19.5 | 1 | 19.5 | | |

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

**switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)**

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A = 25^\circ\text{C}$ | | | SN54LV157A | | SN74LV157A | | UNIT |
|-----------|------------------|-------------|----------------------|--------------------------|------|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t_{pd} | A or B | Y | $C_L = 15\text{ pF}$ | 3.6* | 6.4* | 1* | 7.5* | 1 | 7.5 | ns | |
| | $\overline{A/B}$ | Y | | 4.1* | 8.1* | 1* | 9.5* | 1 | 9.5 | | |
| | \overline{G} | Y | | 3.8* | 8.6* | 1* | 10* | 1 | 10 | | |
| t_{pd} | A or B | Y | $C_L = 50\text{ pF}$ | 4.8 | 8.4 | 1 | 9.5 | 1 | 9.5 | ns | |
| | $\overline{A/B}$ | Y | | 5.4 | 10.1 | 1 | 11.5 | 1 | 11.5 | | |
| | \overline{G} | Y | | 5 | 10.6 | 1 | 12 | 1 | 12 | | |

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

noise characteristics, $V_{CC} = 3.3\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Note 5)

| PARAMETER | | SN74LV157A | | | UNIT |
|-------------|--|------------|------|-----|------|
| | | MIN | TYP | MAX | |
| $V_{OL(P)}$ | Quiet output, maximum dynamic V_{OL} | 0.3 | 0.8 | | V |
| $V_{OL(V)}$ | Quiet output, minimum dynamic V_{OL} | -0.1 | -0.8 | | V |
| $V_{OH(V)}$ | Quiet output, minimum dynamic V_{OH} | 3.2 | | | V |
| $V_{IH(D)}$ | High-level dynamic input voltage | 2.31 | | | V |
| $V_{IL(D)}$ | Low-level dynamic input voltage | | 0.99 | | V |

NOTE 5: Characteristics are for surface-mount packages only.

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operating characteristics, $T_A = 25^\circ\text{C}$

| PARAMETER | | TEST CONDITIONS | V _{CC} | TYP | UNIT |
|---|--|---------------------------------------|-----------------|------|------|
| C _{pd} Power dissipation capacitance | | C _L = 50 pF, f = 10 MHz | 3.3 V | 12.1 | pF |
| | | | 5 V | 13.1 | |

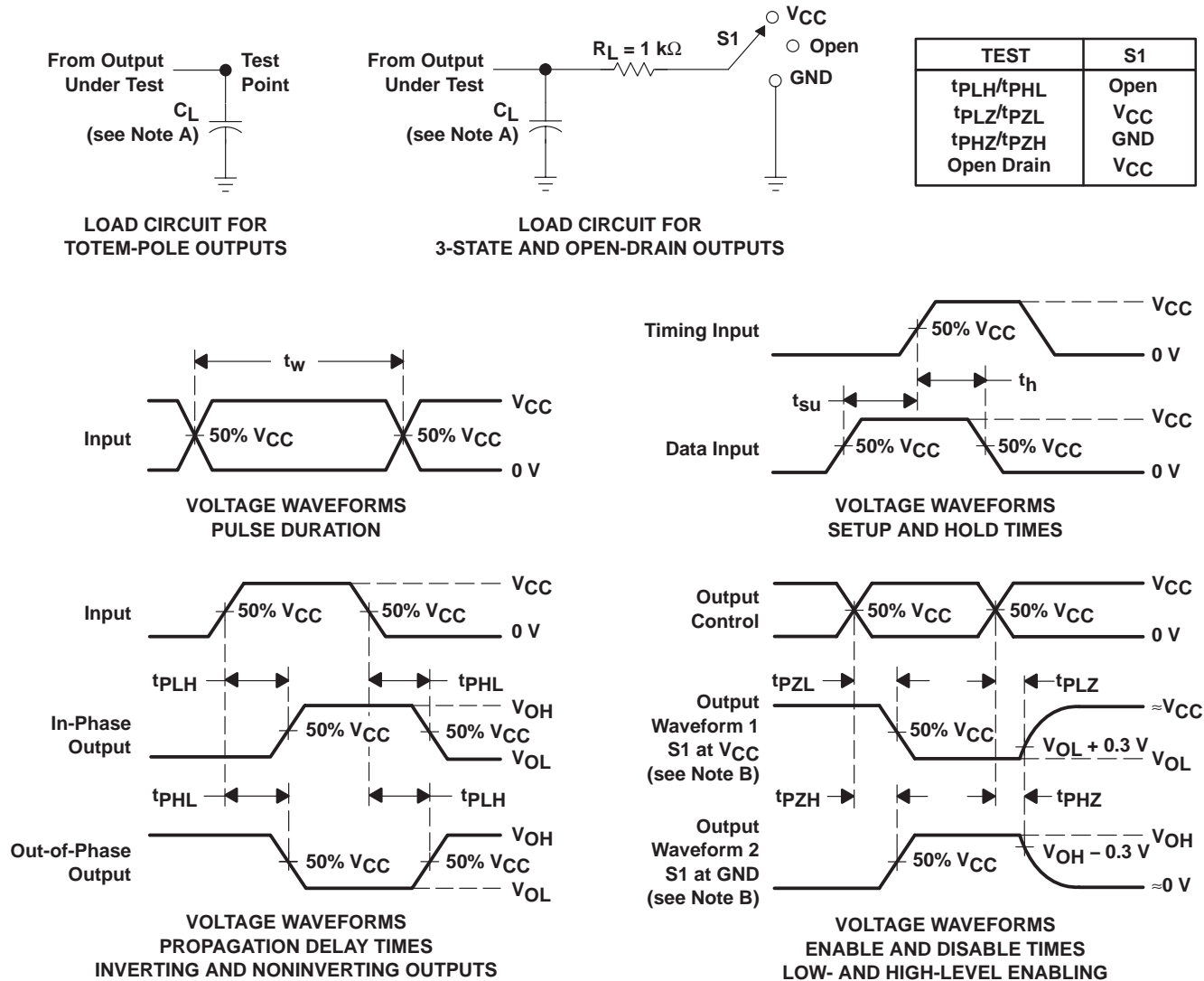


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PARAMETER MEASUREMENT INFORMATION



- 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. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - D. The outputs are measured one at a time, with one input transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PHL} and t_{PLH} are the same as t_{pd} .
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| SN74LV157AD | ACTIVE | SOIC | D | 16 | 40 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LV157ADBR | ACTIVE | SSOP | DB | 16 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LV157ADGVR | ACTIVE | TVSOP | DGV | 16 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74LV157ADR | ACTIVE | SOIC | D | 16 | 2500 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LV157ANSR | ACTIVE | SO | NS | 16 | 2000 | Pb-Free (RoHS) | CU NIPDAU | Level-2-260C-1 YEAR/ Level-1-235C-UNLIM |
| SN74LV157APW | ACTIVE | TSSOP | PW | 16 | 90 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |
| SN74LV157APWR | ACTIVE | TSSOP | PW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LV157APWT | ACTIVE | TSSOP | PW | 16 | 250 | Pb-Free (RoHS) | CU NIPDAU | Level-1-250C-UNLIM |

⁽¹⁾ 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.

⁽²⁾ 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.

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

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DGV (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.
 D. Falls within JEDEC: 24/48 Pins – MO-153
 14/16/20/56 Pins – MO-194

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AC.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-150

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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