

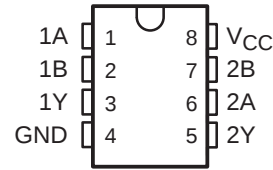
# SN75471 THRU SN75473 DUAL PERIPHERAL DRIVERS

SLRS024 – DECEMBER 1976 – REVISED MAY 1990

## PERIPHERAL DRIVERS FOR HIGH-VOLTAGE HIGH-CURRENT DRIVER APPLICATIONS

- Characterized for Use to 300 mA
- High-Voltage Outputs
- No Output Latch-Up at 55 V (After Conducting 300 mA)
- Medium-Speed Switching
- Circuit Flexibility for Varied Applications and Choice of Logic Function
- TTL-Compatible Diode-Clamped Inputs
- Standard Supply Voltages
- Plastic DIP (P) With Copper Lead Frame Provides Cooler Operation and Improved Reliability

### D OR P PACKAGE (TOP VIEW)



### SUMMARY OF SERIES SN75471

| DEVICE  | LOGIC OF COMPLETE CIRCUIT | PACKAGES |
|---------|---------------------------|----------|
| SN75471 | AND                       | D, P     |
| SN75472 | NAND                      | D, P     |
| SN75473 | OR                        | D, P     |

## description

Series SN75471 dual peripheral drivers are functionally interchangeable with series SN75451B and series SN75461 peripheral drivers, but are designed for use in systems that require higher breakdown voltages than either of those series can provide at the expense of slightly slower switching speeds than series 75451B (limits are the same as series SN75461). Typical applications include high-speed logic buffers, power drivers, relay drivers, lamp drivers, MOS drivers, line drivers, and memory drivers.

The SN75471, SN75472, and SN75473 are dual peripheral AND, NAND, and OR drivers, respectively, (assuming positive logic), with the output of the logic gates internally connected to the bases of the npn output transistors.

Series SN75471 drivers are characterized for operation from 0°C to 70°C.

SN75471 THRU SN75473  
DUAL PERIPHERAL DRIVERS

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

|                                                                                           |                              |
|-------------------------------------------------------------------------------------------|------------------------------|
| Supply voltage, $V_{CC}$ (see Note 1)                                                     | 7 V                          |
| Input voltage, $V_I$                                                                      | 5.5 V                        |
| Inter-emitter voltage (see Note 2)                                                        | 5.5 V                        |
| Off-state output voltage, $V_O$                                                           | 70 V                         |
| Continuous collector or output current (see Note 3)                                       | 400 mA                       |
| Peak collector or output current ( $t_w \leq 10$ ms, duty cycle $\leq 50\%$ , see Note 3) | 500 mA                       |
| Continuous total power dissipation                                                        | See Dissipation Rating Table |
| Operating free-air temperature range, $T_A$                                               | 0°C to 70°C                  |
| Storage temperature range, $T_{stg}$                                                      | –65°C to 150°C               |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds                              | 260°C                        |

- NOTES: 1. Voltage values are with respect to the network GND, unless otherwise specified.  
2. This is the voltage between two emitters, A and B.  
3. Both halves of these dual circuits may conduct rated current simultaneously; however, power dissipation averaged over a short time interval must fall within the continuous dissipation rating.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING |
|---------|---------------------------------------------|---------------------------------------------------|------------------------------------------|
| D       | 725 mW                                      | 5.8 mW/°C                                         | 464 mW                                   |
| P       | 1000 mW                                     | 8.0 mW/°C                                         | 640 mW                                   |

recommended operating conditions

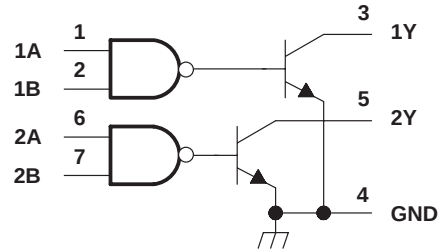
|                                       | MIN  | NOM | MAX  | UNIT |
|---------------------------------------|------|-----|------|------|
| Supply voltage, $V_{CC}$              | 4.75 | 5   | 5.25 | V    |
| High-level input voltage, $V_{IH}$    | 2    |     |      | V    |
| Low-level input voltage, $V_{IL}$     |      |     | 0.8  | V    |
| Operating free-air temperature, $T_A$ | 0    |     | 70   | °C   |

## logic symbol†



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

## logic diagram (positive logic)

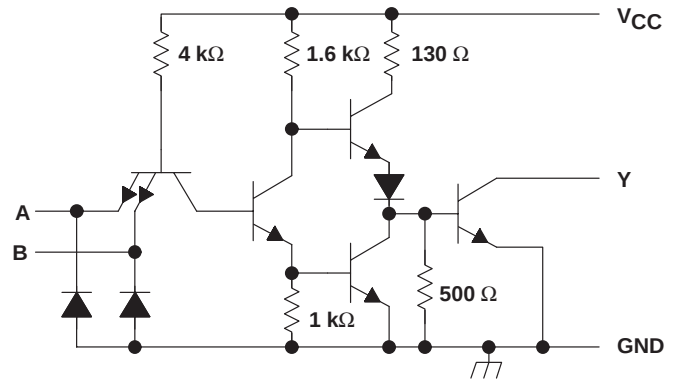


**SN75471 FUNCTION TABLE**  
(each driver)

| A | B | Y             |
|---|---|---------------|
| L | L | L (on state)  |
| L | H | L (on state)  |
| H | L | L (on state)  |
| H | H | H (off state) |

positive logic:  
 $Y = AB \text{ or } \bar{A} + \bar{B}$

**SN75471 schematic (each driver)**



Resistor values shown are nominal.

## electrical characteristics over recommended operating free-air temperature range

| PARAMETER                                    | TEST CONDITIONS                                                                  | SN75471 |      |     | UNIT          |
|----------------------------------------------|----------------------------------------------------------------------------------|---------|------|-----|---------------|
|                                              |                                                                                  | MIN     | TYP‡ | MAX |               |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = 4.75 \text{ V}$ , $I_I = -12 \text{ mA}$                               | -1.2    | -1.5 |     | V             |
| $I_{OH}$ High-level output current           | $V_{CC} = 4.75 \text{ V}$ , $V_{IH} = 2 \text{ V}$ , $V_{OH} = 70 \text{ V}$     |         |      | 100 | $\mu\text{A}$ |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = 4.75 \text{ V}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 100 \text{ mA}$ | 0.25    | 0.4  |     | V             |
|                                              | $V_{CC} = 4.75 \text{ V}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 300 \text{ mA}$ | 0.5     | 0.7  |     |               |
| $I_I$ Input current at maximum input voltage | $V_{CC} = 5.25 \text{ V}$ , $V_I = 5.5 \text{ V}$                                |         |      | 1   | mA            |
| $I_{IH}$ High-level input current            | $V_{CC} = 5.25 \text{ V}$ , $V_I = 2.4 \text{ V}$                                |         |      | 40  | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current             | $V_{CC} = 5.25 \text{ V}$ , $V_I = 0.4 \text{ V}$                                | -1      | -1.6 |     | mA            |
| $I_{CCH}$ Supply current, outputs high       | $V_{CC} = 5.25 \text{ V}$ , $V_I = 5 \text{ V}$                                  | 7       | 11   |     | mA            |
| $I_{CCL}$ Supply current, outputs low        | $V_{CC} = 5.25 \text{ V}$ , $V_I = 0$                                            | 52      | 65   |     | mA            |

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

## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$

| PARAMETER                                                  | TEST CONDITIONS                                                                            | SN75471    |     |     | UNIT |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------|-----|-----|------|
|                                                            |                                                                                            | MIN        | TYP | MAX |      |
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $I_O \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ ,<br>$R_L = 50 \Omega$ , See Figure 1 |            | 30  | 55  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level output |                                                                                            |            | 25  | 40  |      |
| $t_{TLH}$ Transition time, low-to-high-level output        |                                                                                            |            | 8   | 20  |      |
| $t_{THL}$ Transition time, high-to-low-level output        |                                                                                            |            | 10  | 20  |      |
| $V_{OH}$ High-level output voltage after switching         | $V_S = 55 \text{ V}$ , $I_O \approx 300 \text{ mA}$ ,<br>See Figure 2                      | $V_S - 18$ |     |     | mV   |

SN75471 THRU SN75473  
DUAL PERIPHERAL DRIVERS

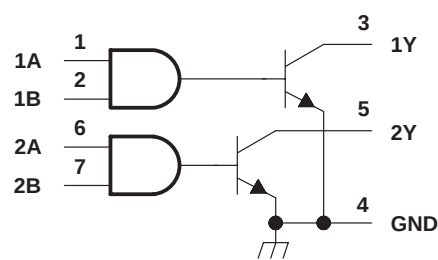
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logic symbol†



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

logic diagram (positive logic)

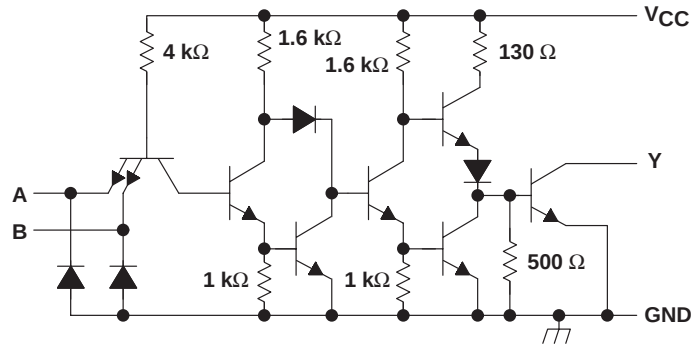


SN75472 FUNCTION TABLE  
(each driver)

| A | B | Y             |
|---|---|---------------|
| L | L | H (off state) |
| L | H | H (off state) |
| H | L | H (off state) |
| H | H | L (on state)  |

positive logic:  
 $Y = \overline{AB}$  or  $\overline{A} + \overline{B}$

SN75472 schematic (each driver)



Resistor values shown are nominal.

electrical characteristics over recommended operating free-air temperature range

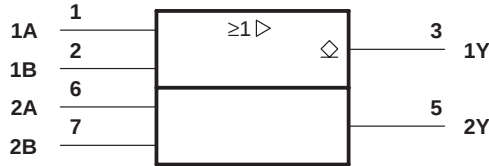
| PARAMETER                                             | TEST CONDITIONS                                                             | SN75472 |      |     | UNIT |
|-------------------------------------------------------|-----------------------------------------------------------------------------|---------|------|-----|------|
|                                                       |                                                                             | MIN     | TYP‡ | MAX |      |
| V <sub>IK</sub> Input clamp voltage                   | V <sub>CC</sub> = 4.75 V, I <sub>I</sub> = -12 mA                           | -1.2    | -1.5 |     | V    |
| I <sub>OH</sub> High-level output current             | V <sub>CC</sub> = 4.75 V, V <sub>IH</sub> = 2 V, V <sub>OH</sub> = 70 V     |         | 100  |     | μA   |
| V <sub>OL</sub> Low-level output voltage              | V <sub>CC</sub> = 4.75 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 100 mA | 0.25    | 0.4  |     | V    |
|                                                       | V <sub>CC</sub> = 4.75 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 300 mA | 0.5     | 0.7  |     |      |
| I <sub>I</sub> Input current at maximum input voltage | V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 5.5 V                            |         | 1    |     | mA   |
| I <sub>IH</sub> High-level input current              | V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 2.4 V                            |         | 40   |     | μA   |
| I <sub>IL</sub> Low-level input current               | V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 0.4 V                            | -1      | -1.6 |     | mA   |
| I <sub>CCH</sub> Supply current, outputs high         | V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 5 V                              | 13      | 17   |     | mA   |
| I <sub>CCL</sub> Supply current, outputs low          | V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 0                                | 61      | 76   |     | mA   |

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

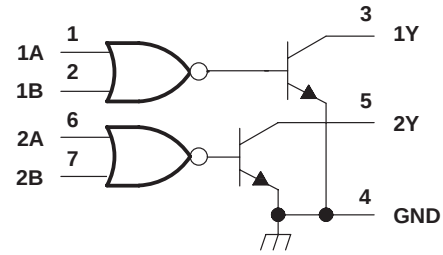
| PARAMETER                                                         | TEST CONDITIONS                                                                      | SN75472             |     |     | UNIT |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------|-----|-----|------|
|                                                                   |                                                                                      | MIN                 | TYP | MAX |      |
| t <sub>PLH</sub> Propagation delay time, low-to-high-level output | I <sub>O</sub> ≈ 200 mA, C <sub>L</sub> = 15 pF, R <sub>L</sub> = 50 Ω, See Figure 1 |                     | 45  | 65  | ns   |
| t <sub>PHL</sub> Propagation delay time, high-to-low-level output |                                                                                      |                     | 30  | 50  |      |
| t <sub>TLH</sub> Transition time, low-to-high-level output        |                                                                                      |                     | 13  | 25  |      |
| t <sub>THL</sub> Transition time, high-to-low-level output        |                                                                                      |                     | 10  | 20  |      |
| V <sub>OH</sub> High-level output voltage after switching         | V <sub>S</sub> = 55 V, I <sub>O</sub> ≈ 300 mA, See Figure 2                         | V <sub>S</sub> - 18 |     |     | mV   |

## logic symbol†



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

## logic diagram (positive logic)

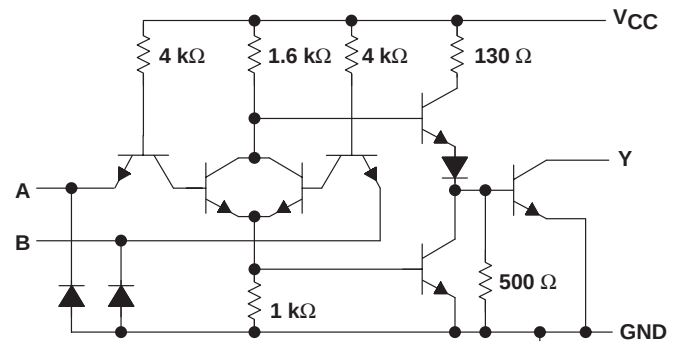


**FUNCTION TABLE  
(each driver)**

| A | B | Y             |
|---|---|---------------|
| L | L | L (on state)  |
| L | H | H (off state) |
| H | L | H (off state) |
| H | H | H (off state) |

positive logic:  
 $Y = A + B$  or  $\overline{A} \overline{B}$

## schematic (each driver)



Resistor values shown are nominal.

## electrical characteristics over recommended operating free-air temperature range

| PARAMETER                                    | TEST CONDITIONS                                                                  | SN75473 |      |     | UNIT          |
|----------------------------------------------|----------------------------------------------------------------------------------|---------|------|-----|---------------|
|                                              |                                                                                  | MIN     | TYP‡ | MAX |               |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = 4.75 \text{ V}$ , $I_I = -12 \text{ mA}$                               | -1.2    | -1.5 |     | V             |
| $I_{OH}$ High-level output current           | $V_{CC} = 4.75 \text{ V}$ , $V_{IH} = 2 \text{ V}$ , $V_{OH} = 70 \text{ V}$     |         |      | 100 | $\mu\text{A}$ |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = 4.75 \text{ V}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 100 \text{ mA}$ | 0.25    | 0.4  |     | V             |
|                                              | $V_{CC} = 4.75 \text{ V}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 300 \text{ mA}$ | 0.5     | 0.7  |     |               |
| $I_I$ Input current at maximum input voltage | $V_{CC} = 5.25 \text{ V}$ , $V_I = 5.5 \text{ V}$                                |         |      | 1   | mA            |
| $I_{IH}$ High-level input current            | $V_{CC} = 5.25 \text{ V}$ , $V_I = 2.4 \text{ V}$                                |         |      | 40  | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current             | $V_{CC} = 5.25 \text{ V}$ , $V_I = 0.4 \text{ V}$                                | -1      | -1.6 |     | mA            |
| $I_{CCH}$ Supply current, outputs high       | $V_{CC} = 5.25 \text{ V}$ , $V_I = 5 \text{ V}$                                  |         | 8    | 11  | mA            |
| $I_{CCL}$ Supply current, outputs low        | $V_{CC} = 5.25 \text{ V}$ , $V_I = 0$                                            |         | 58   | 76  | mA            |

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

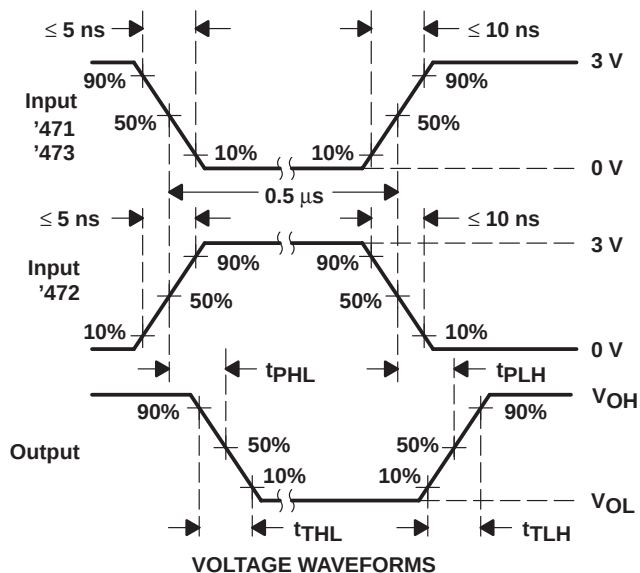
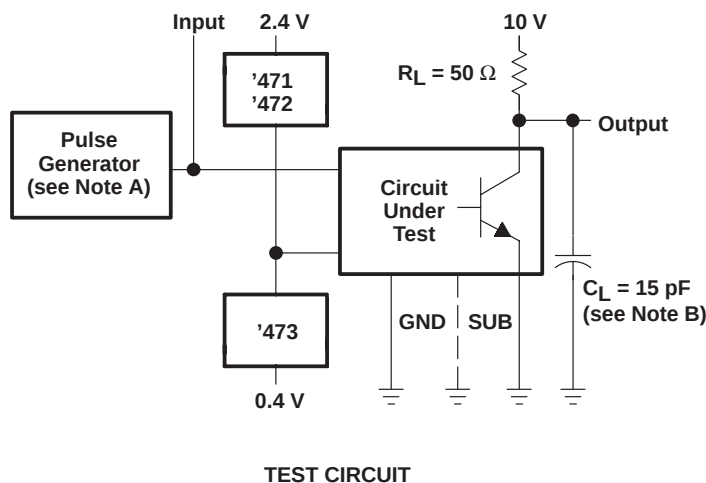
## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$

| PARAMETER                                                  | TEST CONDITIONS                                                                            | SN75473    |     |     | UNIT |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------|-----|-----|------|
|                                                            |                                                                                            | MIN        | TYP | MAX |      |
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $I_O \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ ,<br>$R_L = 50 \Omega$ , See Figure 1 |            | 30  | 55  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level output |                                                                                            |            | 25  | 40  |      |
| $t_{TLH}$ Transition time, low-to-high-level output        |                                                                                            |            | 8   | 25  |      |
| $t_{THL}$ Transition time, high-to-low-level output        |                                                                                            |            | 10  | 25  |      |
| $V_{OH}$ High-level output voltage after switching         | $V_S = 55 \text{ V}$ , $I_O \approx 300 \text{ mA}$ ,<br>See Figure 2                      | $V_S - 18$ |     |     | mV   |

# SN75471 THRU SN75473 DUAL PERIPHERAL DRIVERS

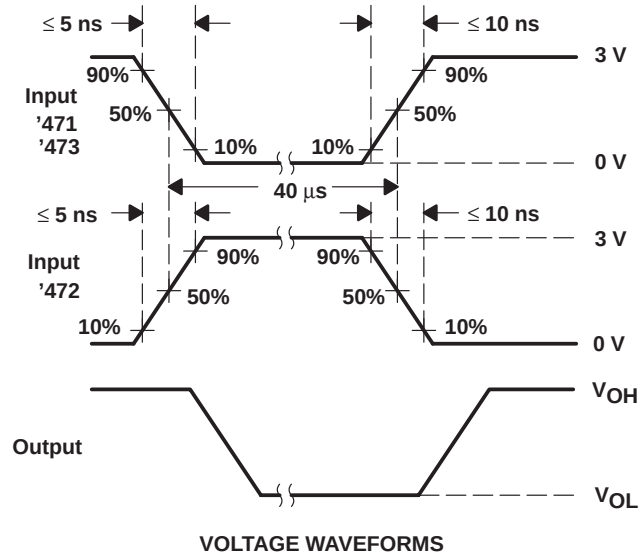
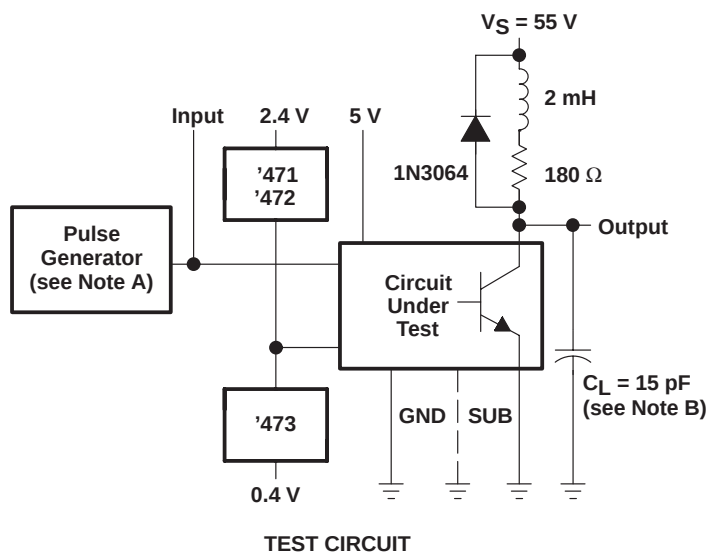
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## PARAMETER MEASUREMENT INFORMATION



- NOTES: A. The pulse generator has the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O \approx 50 \Omega$ .  
B.  $C_L$  includes probe and jig capacitance.

**Figure 1. Switching Times**



- NOTES: A. The pulse generator has the following characteristics:  $PRR \leq 12.5 \text{ kHz}$ ,  $Z_O \approx 50 \Omega$ .  
B.  $C_L$  includes probe and jig capacitance.

**Figure 2. Latch-Up Test**

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN75471D         | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 75471                   | <a href="#">Samples</a> |
| SN75471DR        | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 75471                   | <a href="#">Samples</a> |
| SN75471P         | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN75471P                | <a href="#">Samples</a> |
| SN75472D         | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 75472                   | <a href="#">Samples</a> |
| SN75472DE4       | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 75472                   | <a href="#">Samples</a> |
| SN75472DG4       | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 75472                   | <a href="#">Samples</a> |
| SN75472P         | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN75472P                | <a href="#">Samples</a> |
| SN75472PE4       | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN75472P                | <a href="#">Samples</a> |
| SN75473D         | OBSOLETE      | SOIC         | D                  | 8    |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                         |                         |
| SN75473P         | OBSOLETE      | PDIP         | P                  | 8    |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                         |                         |

(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 - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**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.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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**TAPE AND REEL INFORMATION**


\*All dimensions are nominal

| Device    | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-----------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN75471DR | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device    | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN75471DR | SOIC         | D               | 8    | 2500 | 340.5       | 338.1      | 20.6        |

P (R-PDIP-T8)

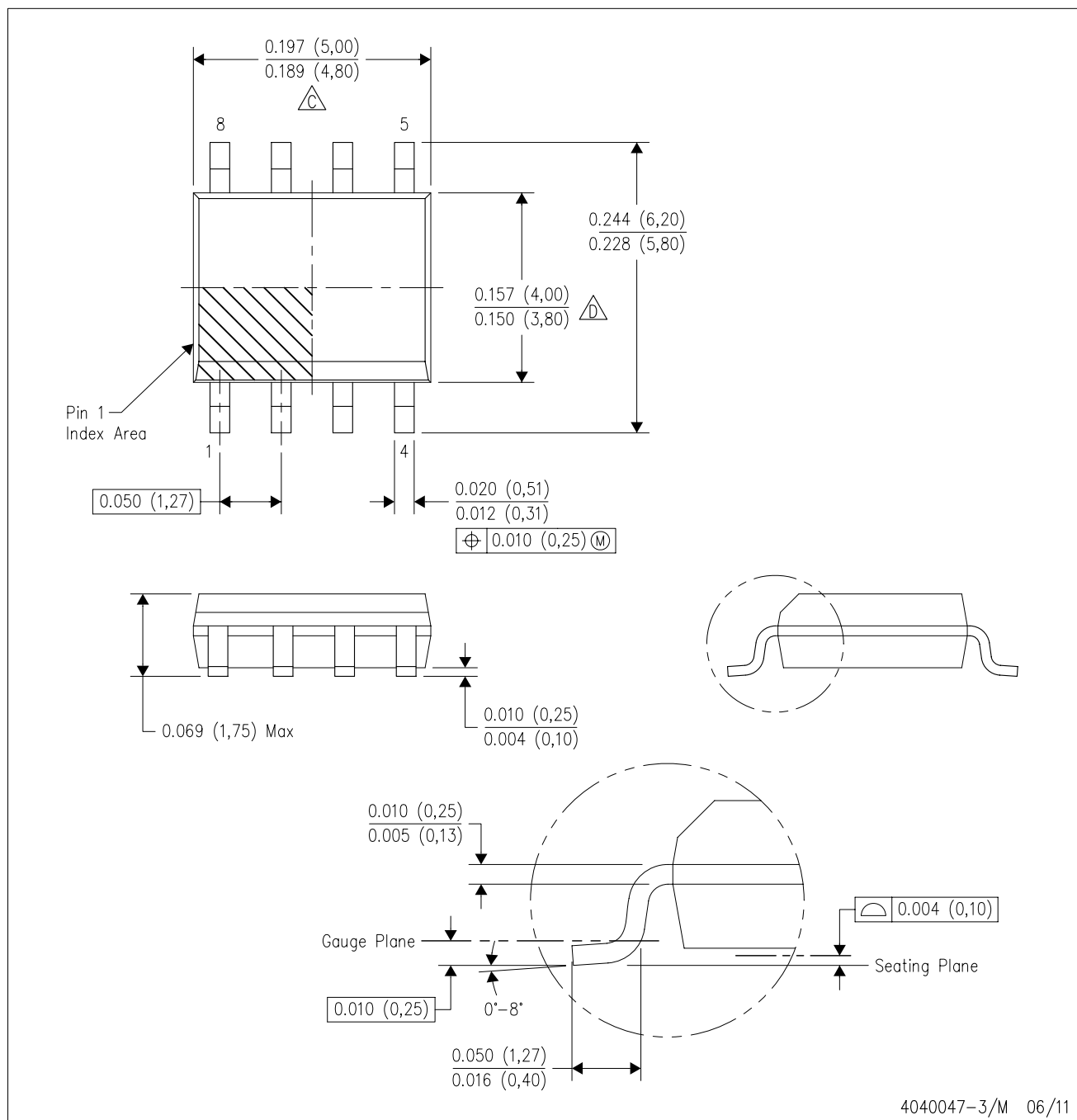
PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.

D (R-PDSO-G8)

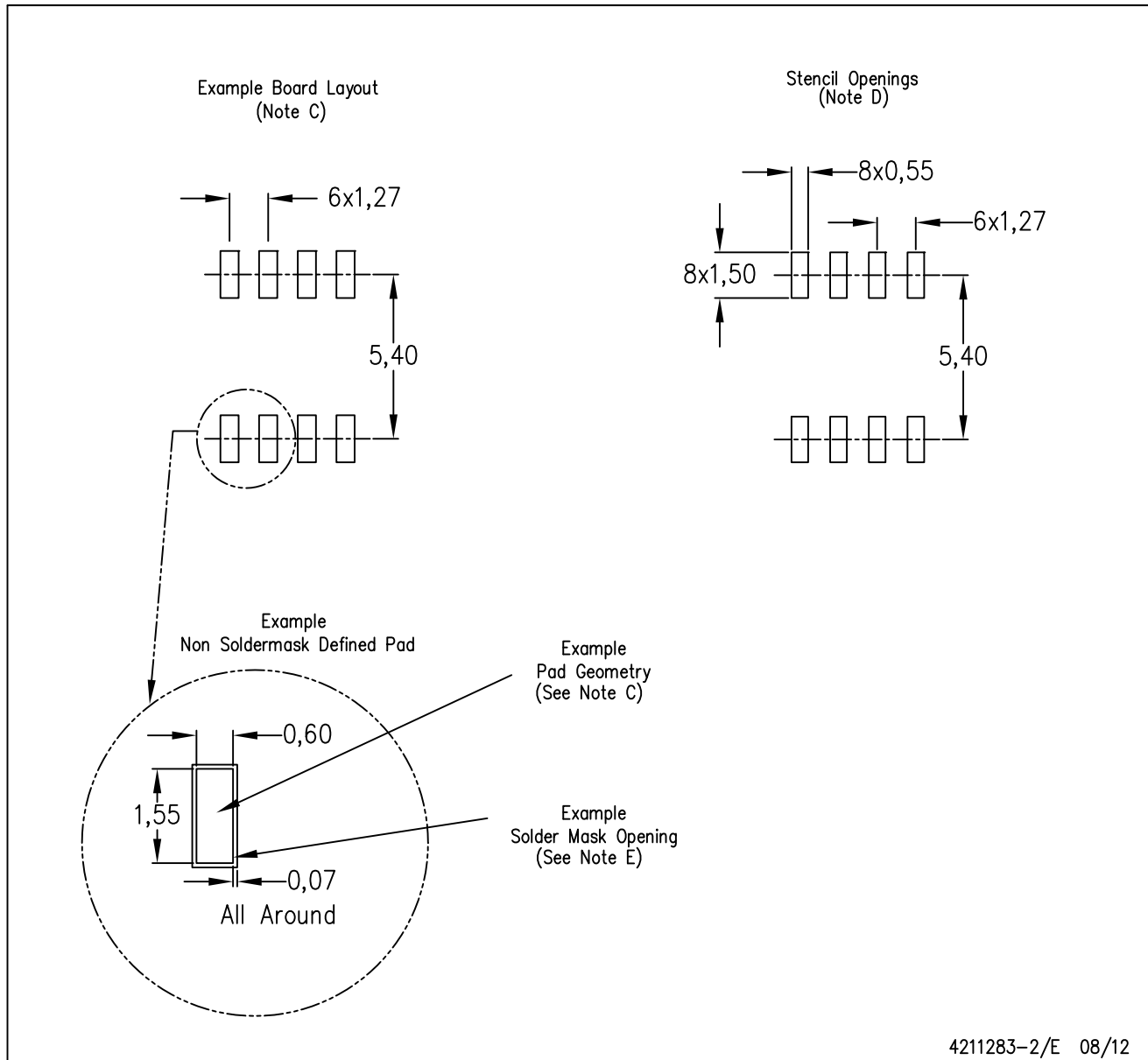
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AA.

D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



4211283-2/E 08/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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|                               |                                                                                          |
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