

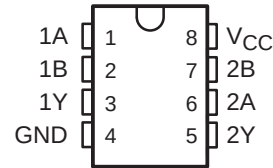
# SN75471 THRU SN75473 DUAL PERIPHERAL DRIVERS

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   |



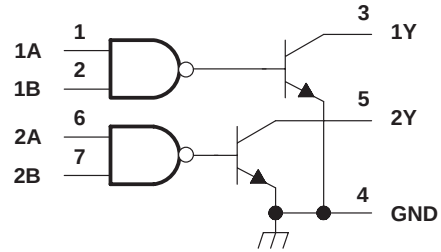
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## logic symbol†



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

## logic diagram (positive logic)

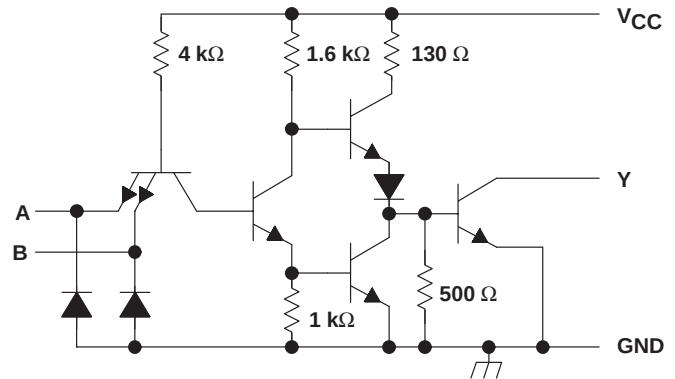


**SN75471 FUNCTION TABLE**  
(each driver)

| 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:  
 $Y = AB$  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

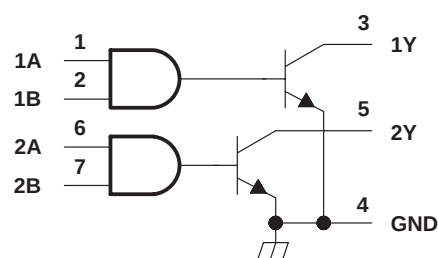
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logic symbol†



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

logic diagram (positive logic)

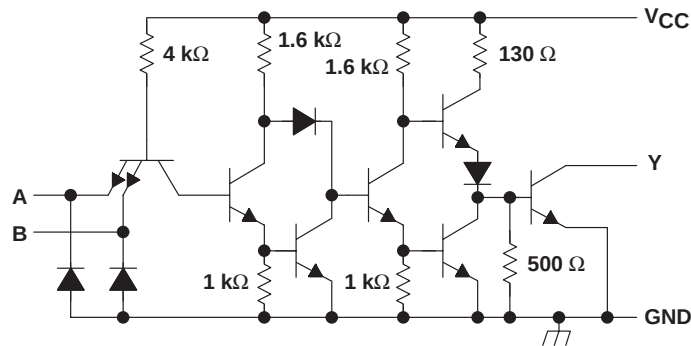


SN75472 FUNCTION TABLE  
(each driver)

| 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

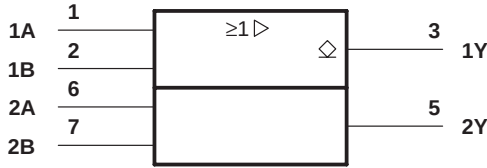
| PARAMETER                                             | TEST CONDITIONS                                                             | SN75472 |      |     | UNIT |
|-------------------------------------------------------|-----------------------------------------------------------------------------|---------|------|-----|------|
|                                                       |                                                                             | 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

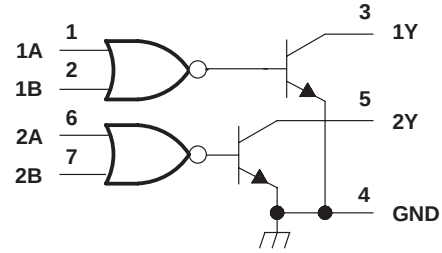
| PARAMETER                                                         | TEST CONDITIONS                                                                      | SN75472             |     |     | UNIT |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------|-----|-----|------|
|                                                                   |                                                                                      | 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)

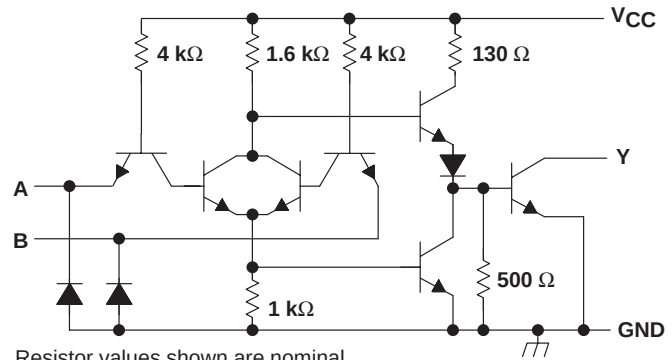


**FUNCTION TABLE**  
(each driver)

| 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  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

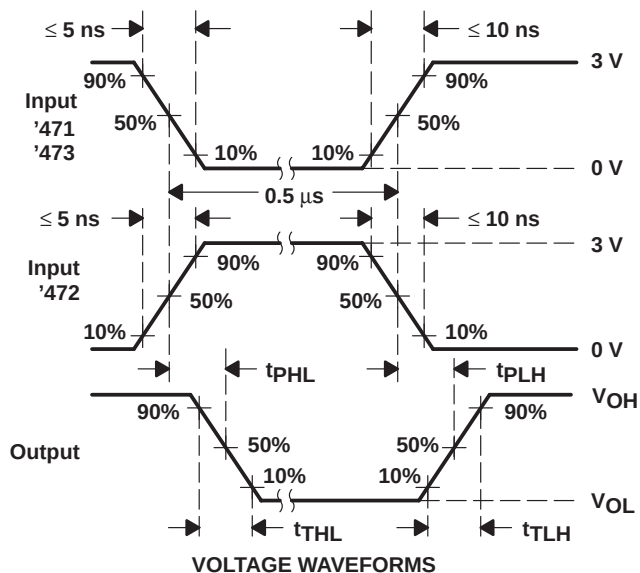
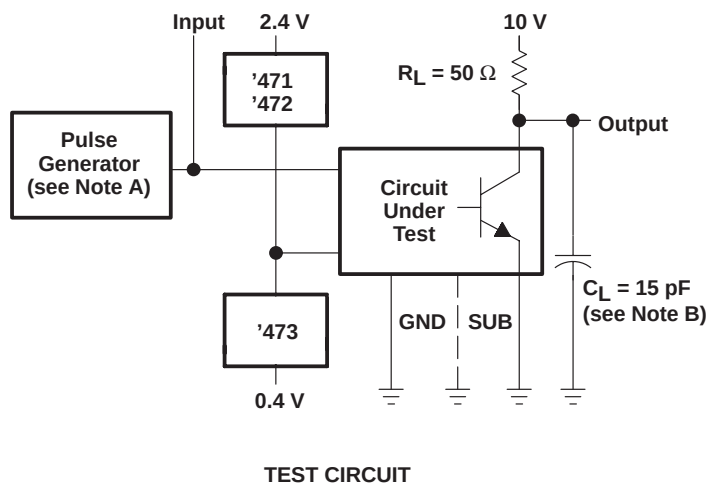
## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$

| 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

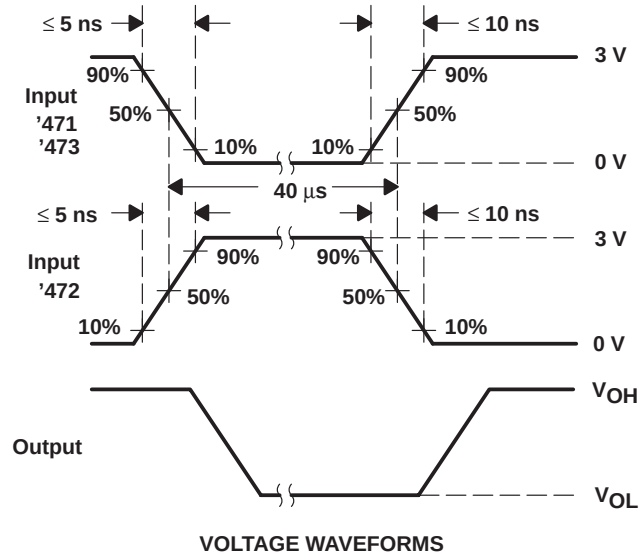
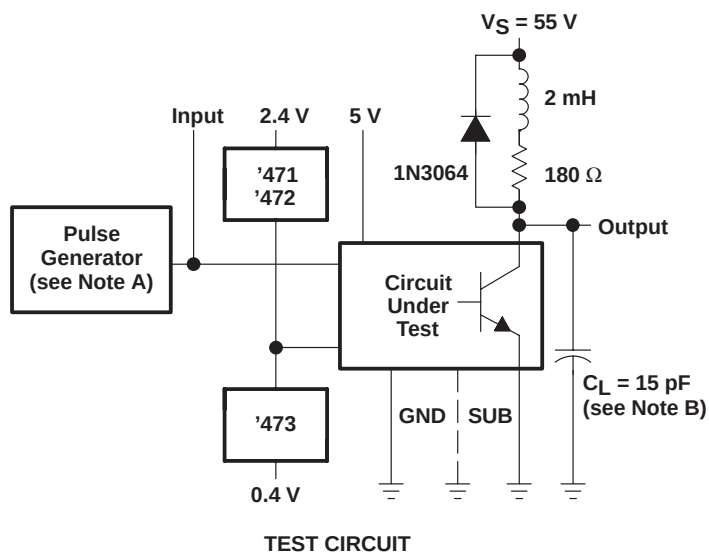
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## PARAMETER MEASUREMENT INFORMATION



- 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**

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