

# SN55461 THRU SN55463 SN75461 THRU SN75463 DUAL PERIPHERAL DRIVERS

SLRS022A – DECEMBER 1976 – REVISED OCTOBER 1995

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

- Characterized for Use to 300 mA
- High-Voltage Outputs
- No Output Latch-Up at 30 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 for Cooler Operation and Improved Reliability
- Package Options Include Plastic Small Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

SUMMARY OF SERIES 55461/75461

| DEVICE  | LOGIC | PACKAGES |
|---------|-------|----------|
| SN55461 | AND   | FK, JG   |
| SN55462 | NAND  | FK, JG   |
| SN55463 | OR    | FK, JG   |
| SN75461 | AND   | D, P     |
| SN75462 | NAND  | D, P     |
| SN75463 | OR    | D, P     |

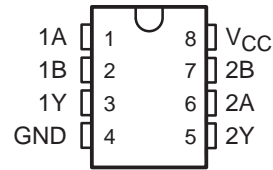
### description

These dual peripheral drivers are functionally interchangeable with SN55451B through SN55453B and SN75451B through SN75453B peripheral drivers, but are designed for use in systems that require higher breakdown voltages than those devices can provide at the expense of slightly slower switching speeds. Typical applications include logic buffers, power drivers, relay drivers, lamp drivers, MOS drivers, line drivers, and memory drivers.

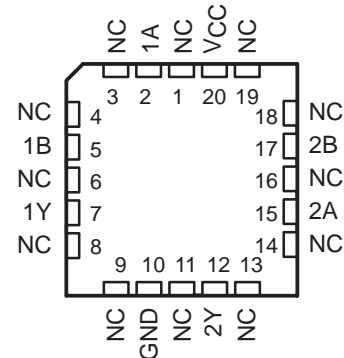
The SN55461/SN75461, SN55462/SN75462, and SN55463/SN75463 are dual peripheral AND, NAND, and OR drivers respectively (assuming positive logic), with the output of the gates internally connected to the bases of the npn output transistors.

Series SN55461 drivers are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . Series SN75461 drivers are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN55461, SN55462, SN55463 . . . JG PACKAGE  
SN75461, SN75462, SN75463 . . . D OR P PACKAGE  
(TOP VIEW)



SN55461, SN55462, SN55463 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

**SN55461 THRU SN55463**  
**SN75461 THRU SN75463**  
**DUAL PERIPHERAL DRIVERS**

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

|   | SN55'                        | SN75'      | UNIT |
|---|------------------------------|------------|------|
| Supply voltage, $V_{CC}$ (see Note 1)   | 7                            | 7          | V    |
| Input voltage, $V_I$  | 5.5                          | 5.5        | V    |
| Intermitter voltage (see Note 2)  | 5.5                          | 5.5        | V    |
| Off-state output voltage, $V_O$   | 35                           | 35         | V    |
| Continuous collector or output current (see Note 3)                                       | 400                          | 400        | mA   |
| Peak collector or output current ( $t_W \leq 10$ ms, duty cycle $\leq 50\%$ , see Note 4) | 500                          | 500        | mA   |
| Continuous total power dissipation  | See Dissipation Rating Table |            |      |
| Operating free-air temperature range, $T_A$   | -55 to 125                   | 0 to 70    | °C   |
| Storage temperature range, $T_{stg}$  | -65 to 150                   | -65 to 150 | °C   |
| Case temperature for 60 seconds, $T_C$  | FK package                   | 260        | °C   |
| Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds                              | JG package                   | 300        | °C   |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds                              | D or P package               | 260        | °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. Voltage values are with respect to network GND unless otherwise specified.
  2. This is the voltage between two emitters A and B.
  3. This value applies when the base-emitter resistance ( $R_{BE}$ ) is equal to or less than 500  $\Omega$ .
  4. 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 | $T_A = 125^\circ\text{C}$<br>POWER RATING |
|---------|---|---|--|---|
| D       | 725 mW                                      | 5.8 mW/°C   | 464 mW                                   | –   |
| FK      | 1375 mW                                     | 11.0 mW/°C  | 880 mW                                   | 275 mW                                    |
| JG      | 1050 mW                                     | 8.4 mW/°C   | 672 mW                                   | 210 mW                                    |
| P       | 1000 mW                                     | 8.0 mW/°C   | 640 mW                                   | –   |

**recommended operating conditions**

|                                       | SN55' |     |     | SN75' |     |      | UNIT |
|---------------------------------------|-------|-----|-----|-------|-----|------|------|
|                                       | MIN   | NOM | MAX | MIN   | NOM | MAX  |      |
| Supply voltage, $V_{CC}$              | 4.5   | 5   | 5.5 | 4.75  | 5   | 5.25 | V    |
| High-level input voltage, $V_{IH}$    | 2     |     |     | 2     |     |      | V    |
| Low-level input voltage, $V_{IL}$     | 0.8   |     |     | 0.8   |     |      | V    |
| Operating free-air temperature, $T_A$ | -55   |     | 125 | 0     |     | 70   | °C   |



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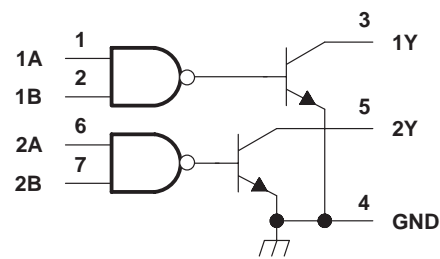
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## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, JG, and P packages.

## logic diagram (positive logic)

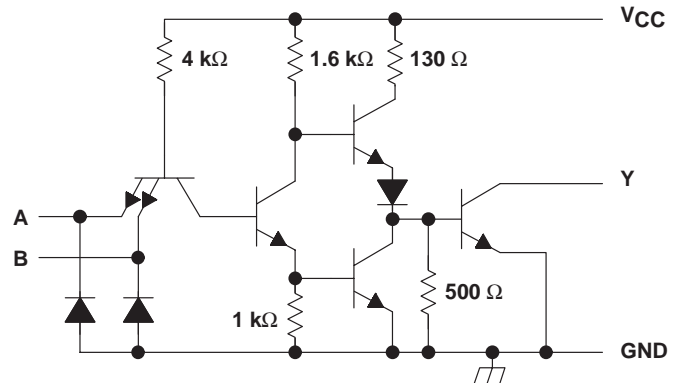


FUNCTION TABLE  
(each driver)

| 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  $\overline{A + B}$

## schematic (each driver)



Resistor values shown are nominal.

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

| PARAMETER                                    | TEST CONDITIONS†   | SN55461 |      | SN75461 |      | UNIT |               |
|--|--|---------|------|---------|------|------|---------------|
|  |  | MIN     | TYP‡ | MAX     | MIN  |      | TYP‡          |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$                               |         | -1.2 | -1.5    | -1.2 | -1.5 | V             |
| $I_{OH}$ High-level output current           | $V_{CC} = \text{MIN}$ , $V_{IH} = \text{MIN}$ , $V_{OH} = 35 \text{ V}$      |         |      | 300     |      | 100  | $\mu\text{A}$ |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 100 \text{ mA}$ |         | 0.25 | 0.5     | 0.25 | 0.4  | V             |
|  | $V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 300 \text{ mA}$ |         | 0.5  | 0.8     | 0.5  | 0.7  |               |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$                                |         |      | 1       |      | 1    | mA            |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$                                |         |      | 40      |      | 40   | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$                                |         | -1   | -1.6    | -1   | -1.6 | mA            |
| $I_{CCH}$ Supply current, outputs high       | $V_{CC} = \text{MAX}$ , $V_I = 5 \text{ V}$                                  |         | 8    | 11      | 8    | 11   | mA            |
| $I_{CCL}$ Supply current, outputs low        | $V_{CC} = \text{MAX}$ , $V_I = 0$  |         | 56   | 76      | 56   | 76   | mA            |

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

‡ 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   | MIN        | TYP | MAX | UNIT |
|--|---|------------|-----|-----|------|
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $I_O \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ , $R_L = 50 \Omega$ , 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         | SN55461   | $V_S - 10$ |     | mV  |      |
|  | SN75461   | $V_S - 10$ |     |     |      |

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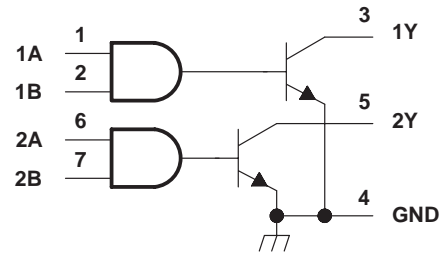
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## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for D, JG, and P packages.

## logic diagram (positive logic)

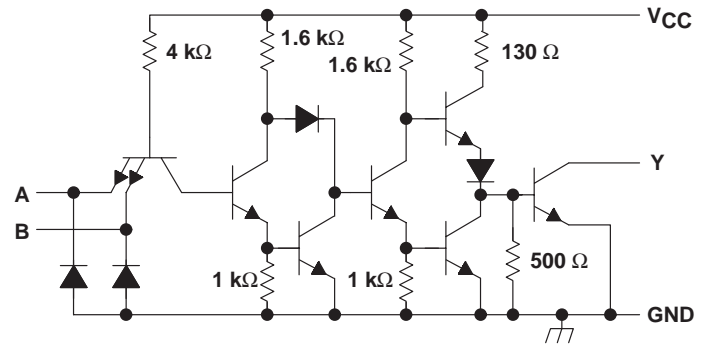


FUNCTION TABLE  
(each driver)

| 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  $\overline{A + B}$

## schematic (each driver)



Resistor values shown are nominal.

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

| PARAMETER                                    | TEST CONDITIONS†  | SN55462 |      | SN75462 |      | UNIT          |
|--|---|---------|------|---------|------|---------------|
|  |   | MIN     | TYP‡ | MAX     | MIN  |               |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$                                | -1.2    | -1.5 | -1.2    | -1.5 | V             |
| $I_{OH}$ High-level output current           | $V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ ,<br>$V_{OH} = 35 \text{ V}$ |         | 300  |         | 100  | $\mu\text{A}$ |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}$ , $V_{IH} = \text{MIN}$ ,<br>$I_{OL} = 100 \text{ mA}$  | 0.25    | 0.5  | 0.25    | 0.4  | V             |
|  | $V_{CC} = \text{MIN}$ , $V_{IH} = \text{MIN}$ ,<br>$I_{OL} = 300 \text{ mA}$  | 0.5     | 0.8  | 0.5     | 0.7  |               |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$                                 |         | 1    |         | 1    | mA            |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$                                 |         | 40   |         | 40   | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$                                 | -1.1    | -1.6 | -1.1    | -1.6 | mA            |
| $I_{CCH}$ Supply current, outputs high       | $V_{CC} = \text{MAX}$ , $V_I = 0$   | 13      | 17   | 13      | 17   | mA            |
| $I_{CCL}$ Supply current, outputs low        | $V_{CC} = \text{MAX}$ , $V_I = 5 \text{ V}$                                   | 61      | 76   | 61      | 76   | mA            |

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

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

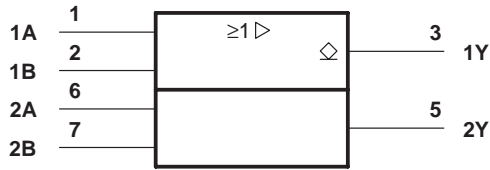
## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$

| PARAMETER  | TEST CONDITIONS   | MIN        | TYP | MAX | UNIT |
|--|---|------------|-----|-----|------|
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $I_O \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ ,<br>$R_L = 50 \Omega$ ,<br>See Figure 1 |            | 45  | 65  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level output |   |            | 30  | 50  |      |
| $t_{TLH}$ Transition time, low-to-high-level output        |   |            | 13  | 25  |      |
| $t_{THL}$ Transition time, high-to-low-level output        |   |            | 10  | 20  |      |
| $V_{OH}$ High-level output voltage after switching         | SN55462   | $V_S - 10$ |     | mV  |      |
|  | SN75462   | $V_S - 10$ |     |     |      |

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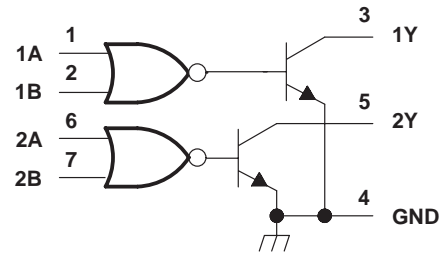
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## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for D, JG, and P packages.

## logic diagram (positive logic)

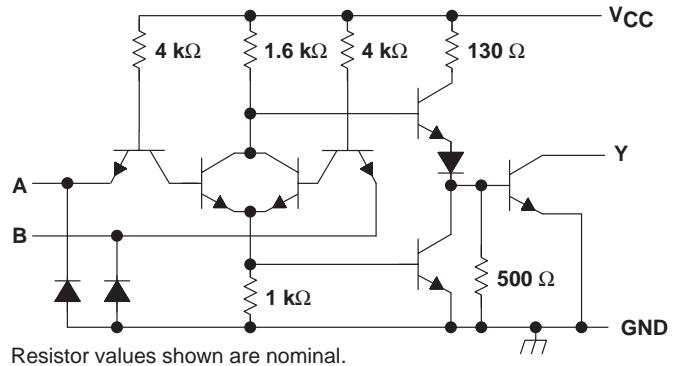


## FUNCTION TABLE (each driver)

| 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)



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

| PARAMETER                                    | TEST CONDITIONS†  | SN55463 |      | SN75463 |      | UNIT          |
|--|---|---------|------|---------|------|---------------|
|  |   | MIN     | TYP‡ | MAX     | MIN  |               |
| $V_{IK}$ Input clamp voltage                 | $V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$                                  | -1.2    | -1.5 | -1.2    | -1.5 | V             |
| $I_{OH}$ High-level output current           | $V_{CC} = \text{MIN}$ , $V_{IH} = \text{MIN}$ ,<br>$V_{OH} = 35 \text{ V}$      |         | 300  |         | 100  | $\mu\text{A}$ |
| $V_{OL}$ Low-level output voltage            | $V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ ,<br>$I_{OL} = 100 \text{ mA}$ | 0.25    | 0.5  | 0.25    | 0.4  | V             |
|  | $V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ ,<br>$I_{OL} = 300 \text{ mA}$ | 0.5     | 0.8  | 0.5     | 0.7  |               |
| $I_I$ Input current at maximum input voltage | $V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$                                   |         | 1    |         | 1    | mA            |
| $I_{IH}$ High-level input current            | $V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$                                   |         | 40   |         | 40   | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current             | $V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$                                   | -1      | -1.6 | -1      | -1.6 | mA            |
| $I_{CCH}$ Supply current, outputs high       | $V_{CC} = \text{MAX}$ , $V_I = 5 \text{ V}$                                     | 8       | 11   | 8       | 11   | mA            |
| $I_{CCL}$ Supply current, outputs low        | $V_{CC} = \text{MAX}$ , $V_I = 0$   | 58      | 76   | 58      | 76   | mA            |

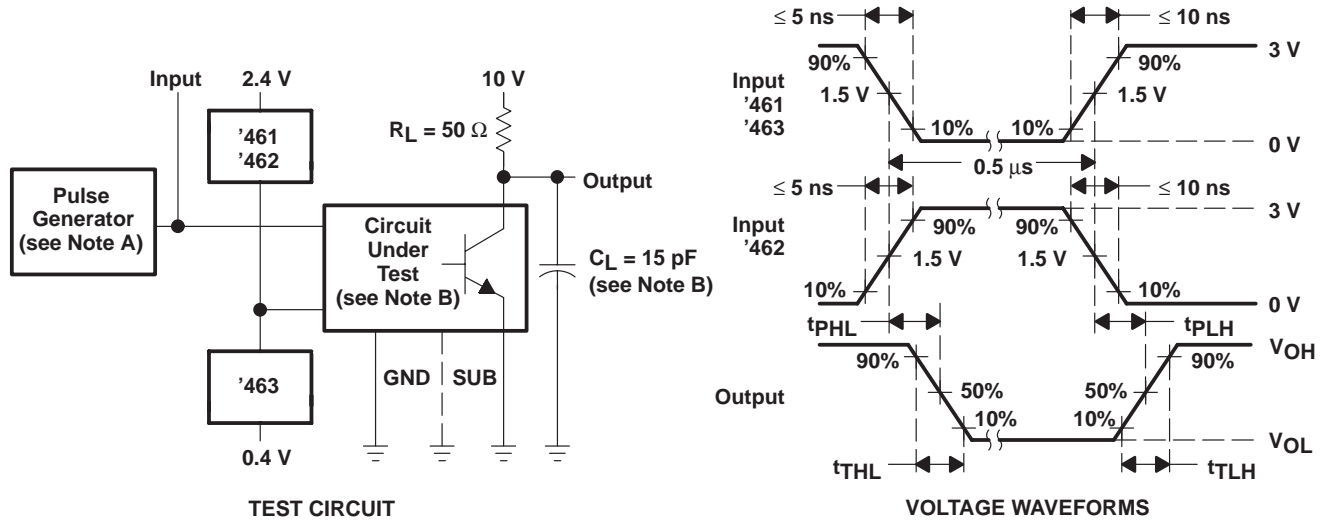
† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

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

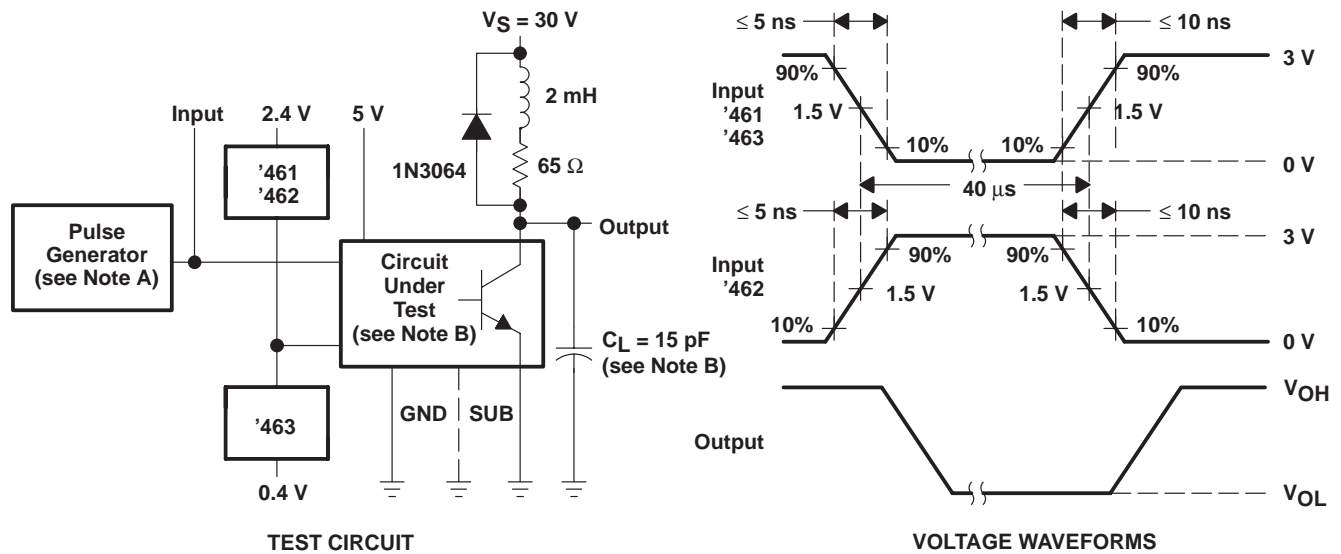
| PARAMETER  | TEST CONDITIONS   | MIN        | TYP | MAX | UNIT |
|--|---|------------|-----|-----|------|
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $I_O \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ ,<br>$R_L = 50 \Omega$ ,<br>See Figure 1 |            | 30  | 55  | ns   |
| $t_{PHL}$ 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         | SN55463   | $V_S - 10$ |     | mV  |      |
|  | SN75463   | $V_S - 10$ |     |     |      |

PARAMETER MEASUREMENT INFORMATION



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

Figure 1. Test Circuit and Voltage Waveforms for Switching Times



NOTES: A. The pulse generator has the following characteristics: PRR ≤ 12.5 kHz,  $Z_O = 50 \Omega$ .  
 B.  $C_L$  includes probe and jig capacitance.

Figure 2. Test Circuit and Voltage Waveforms for Latch-Up Test

PACKAGING INFORMATION

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup>               |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|--|
| JM38510/12908BPA | ACTIVE                | CDIP         | JG              | 8    | 1           | None                    | A42 SNPB         | Level-NC-NC-NC                             |
| JM38510/12909BPA | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |
| SN55461JG        | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |
| SN55462JG        | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |
| SN55463JG        | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |
| SN75461D         | OBSOLETE              | SOIC         | D               | 8    |             | None                    | Call TI          | Call TI                                    |
| SN75461P         | OBSOLETE              | PDIP         | P               | 8    |             | None                    | Call TI          | Call TI                                    |
| SN75462D         | ACTIVE                | SOIC         | D               | 8    | 75          | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN75462DR        | ACTIVE                | SOIC         | D               | 8    | 2500        | Pb-Free (RoHS)          | CU NIPDAU        | Level-2-260C-1 YEAR/<br>Level-1-235C-UNLIM |
| SN75462P         | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | Level-NC-NC-NC                             |
| SN75463D         | OBSOLETE              | SOIC         | D               | 8    |             | None                    | Call TI          | Call TI                                    |
| SN75463DR        | OBSOLETE              | SOIC         | D               | 8    |             | None                    | Call TI          | Call TI                                    |
| SN75463P         | ACTIVE                | PDIP         | P               | 8    | 50          | Pb-Free (RoHS)          | CU NIPDAU        | Level-NC-NC-NC                             |
| SNJ55461FK       | OBSOLETE              | LCCC         | FK              | 20   |             | None                    | Call TI          | Call TI                                    |
| SNJ55461JG       | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |
| SNJ55462FK       | ACTIVE                | LCCC         | FK              | 20   | 1           | None                    | POST-PLATE       | Level-NC-NC-NC                             |
| SNJ55462JG       | ACTIVE                | CDIP         | JG              | 8    | 1           | None                    | A42 SNPB         | Level-NC-NC-NC                             |
| SNJ55463JG       | OBSOLETE              | CDIP         | JG              | 8    |             | None                    | Call TI          | Call TI                                    |

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

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

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

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

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

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

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

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

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

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

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

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