

# TYPES SN54LS63, SN74LS63 HEX CURRENT-SENSING INTERFACE GATES WITH TOTEM-POLE OUTPUTS

REVISED DECEMBER 1983

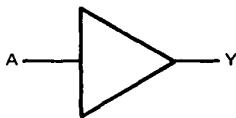
- Translates Low-Level Input Current to Low-Level Output Voltage
- Translates High-Level Input Current to High-Level Output Voltage
- Interfaces to PLA's or Other Logic Elements that Source Current but Do Not Sink Current
- Operates from a Single 5 V Supply
- TTL Compatible
- Low Power Dissipation . . . 40 mW Typical.

## description

Each of these Schottky-clamped interface gates is able to discriminate between low-level ( $\leq 50\mu\text{A}$ ) and high-level ( $\geq 200\mu\text{A}$ ) input currents.

The outputs are fabricated with standard Low-Power Schottky design rules and are compatible with all TTL families.

## logic diagram (each gate)

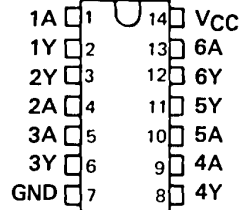


positive logic

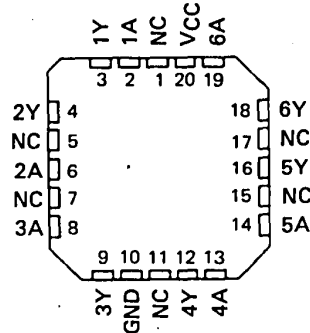
$$Y = A$$

3  
TTL DEVICES

SN54LS63 . . . J OR W PACKAGE  
SN74LS63 . . . D, J OR N PACKAGE  
(TOP VIEW)

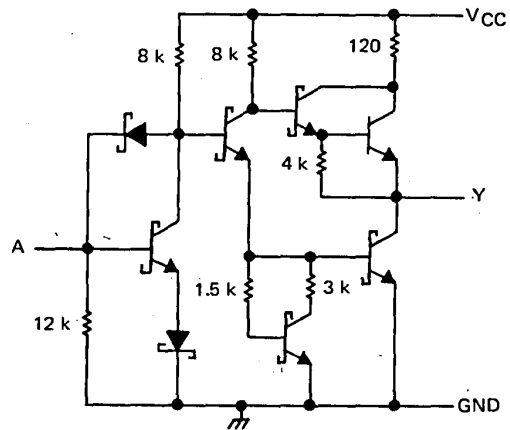


SN54LS63 . . . FK PACKAGE  
SN74LS63 . . . FN PACKAGE  
(TOP VIEW)



NC - No internal connection

## schematic (each gate)



Resistor values shown are nominal and in ohms.

## PRODUCTION DATA

This document contains information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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**TEXAS  
INSTRUMENTS**

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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                                  | 7 V            |
| Operating free-air temperature range: SN54LS63 | -55°C to 125°C |
| SN74LS63                                       | 0°C to 70°C    |
| Storage temperature range                      | -65°C to 150°C |

NOTE 1: Voltage values are with respect to network ground terminal.

### recommended operating conditions

|                                      | SN54LS63 |     |      | SN74LS63 |     |      | UNIT    |
|--------------------------------------|----------|-----|------|----------|-----|------|---------|
|                                      | MIN      | NOM | MAX  | MIN      | NOM | MAX  |         |
| $V_{CC}$ Supply voltage              | 4.5      | 5   | 5.5  | 4.75     | 5   | 5.25 | V       |
| $I_{OH}$ High-level output current   |          |     | -400 |          |     | -400 | $\mu$ A |
| $I_{OL}$ Low-level output current    |          |     | 4    |          |     | 8    | mA      |
| $I_I$ Input current                  |          |     | 1    |          |     | 1    | mA      |
| $T_A$ Operating free-air temperature | -55      |     | 125  | 0        |     | 70   | °C      |

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

| PARAMETER                              | TEST CONDITIONS†  | SN54LS63        |      |      | SN74LS63 |      |      | UNIT |
|--|---|-----------------|------|------|----------|------|------|------|
|  |   | MIN             | TYP‡ | MAX  | MIN      | TYP‡ | MAX  |      |
| $V_I$ Input voltage                    | $I_I = 50 \mu$ A, $V_{CC} = \text{MIN}$                           | 0.35            | 1.05 | 1.75 | 0.6      | 1.05 | 1.6  | V    |
|  | $I_I = 200 \mu$ A, $V_{CC} = \text{MAX}$                          | 0.6             | 1.30 | 2    | 0.85     | 1.30 | 1.8  |      |
| $V_{OH}$ High-level output voltage     | $V_{CC} = \text{MAX}$ , $I_I = 200 \mu$ A, $I_{OH} = -400 \mu$ A, | 3.5             | 3.4  |      | 3.2      | 3.4  |      | V    |
| $V_{OL}$ Low-level output voltage      | $V_{CC} = \text{MIN}$ , $I_I = 50 \mu$ A                          | $I_{OL} = 4$ mA | 0.25 | 0.4  | 0.25     | 0.4  |      | V    |
|  |   | $I_{OL} = 8$ mA |      |      | 0.35     | 0.5  |      |      |
| $I_{OS}$ Short-circuit output current§ | $V_{CC} = \text{MAX}$ , $I_I = 600 \mu$ A                         | -20             |      | -100 | -20      |      | -100 | mA   |
| $I_{CC}$ Supply current                | $V_{CC} = \text{MAX}$ , See Note 2                                |                 | 8    | 16   |          | 8    | 16   | mA   |

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

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

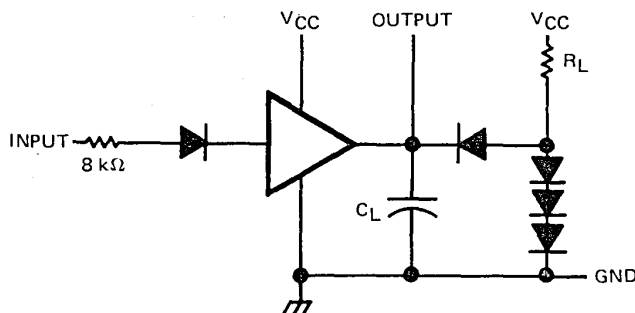
§ Not more than one output should be shorted at a time, and duration of output short circuit should not exceed one second.

NOTE 2:  $I_{CC}$  is measured with inputs and outputs open.

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

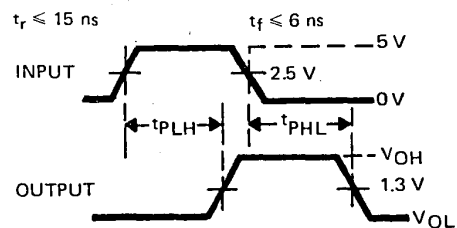
| PARAMETER  | TEST CONDITIONS                      | MIN | TYP | MAX | UNIT |
|--|--------------------------------------|-----|-----|-----|------|
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $R_L = 2$ k $\Omega$ , $C_L = 15$ pF |     | 27  | 45  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level output |                                      | 15  | 25  | ns  |      |

### PARAMETER MEASUREMENT INFORMATION



NOTES: a.  $C_L$  includes probe and jig capacitance  
b. All diodes are IN3064 or equivalent.

TEST CIRCUIT



VOLTAGE WAVEFORMS