



**74V1T03**

## SINGLE 2-INPUT OPEN DRAIN NAND GATE

### PRELIMINARY DATA

- HIGH SPEED:  $t_{PD} = 7 \text{ ns}$  (TYP.) at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 1 \mu A$  (MAX.) at  $T_A = 25^\circ C$
- COMPATIBLE WITH TTL OUTPUTS:  
 $V_{IH} = 2V$  (MIN),  $V_{IL} = 0.8V$  (MAX)
- POWER DOWN PROTECTION ON INPUTS
- OPERATING VOLTAGE RANGE:  
 $V_{CC} \text{ (OPR)} = 4.5V \text{ to } 5.5V$
- IMPROVED LATCH-UP IMMUNITY

### DESCRIPTION

The 74V1T03 is an advanced high-speed CMOS SINGLE 2-INPUT OPEN DRAIN NAND GATE fabricated with sub-micron silicon gate and double-layer metal wiring  $C^2MOS$  technology.

The internal circuit is composed of 3 stages including buffer output, which provide high noise immunity and stable output.



**S**  
(SOT23-5L)



**C**  
(SC-70)

### ORDER CODE:

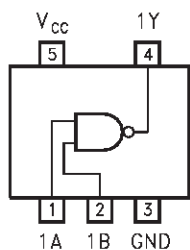
74V1T03S

74V1T03C

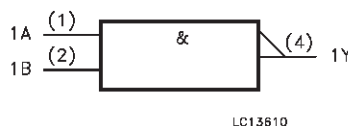
This device can, with an external pull-up resistor, be used in wired AND configuration. This device can also be used as a led driver in any other application requiring a current sink.

Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



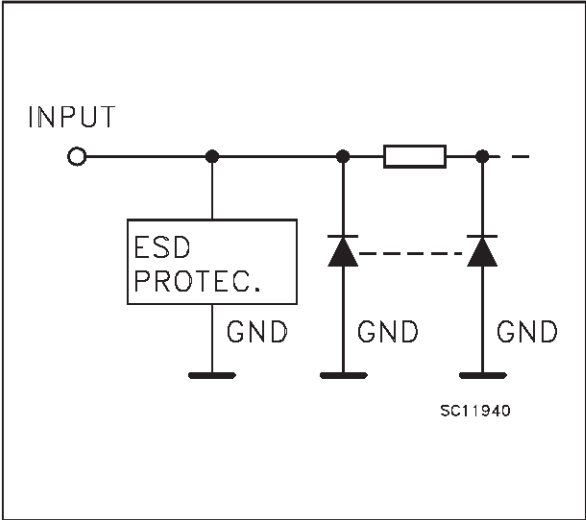
SC12240



LC13610



INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

| PIN No | SYMBOL          | NAME AND FUNCTION       |
|--------|-----------------|-------------------------|
| 1      | 1A              | Data Input              |
| 2      | 1B              | Data Input              |
| 4      | 1Y              | Data Output             |
| 3      | GND             | Ground (0V)             |
| 5      | V <sub>CC</sub> | Positive Supply Voltage |

TRUTH TABLE

| A | B | Y |
|---|---|---|
| L | L | Z |
| L | H | Z |
| H | L | Z |
| H | H | L |

Z: High Impedance

ABSOLUTE MAXIMUM RATINGS

| Symbol                              | Parameter                            | Value                         | Unit |
|-------------------------------------|--------------------------------------|-------------------------------|------|
| V <sub>CC</sub>                     | Supply Voltage                       | -0.5 to +7.0                  | V    |
| V <sub>I</sub>                      | DC Input Voltage                     | -0.5 to +7.0                  | V    |
| V <sub>O</sub>                      | DC Output Voltage                    | -0.5 to V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>                     | DC Input Diode Current               | - 20                          | mA   |
| I <sub>OK</sub>                     | DC Output Diode Current              | ± 20                          | mA   |
| I <sub>O</sub>                      | DC Output Current                    | 25                            | mA   |
| I <sub>CC</sub> or I <sub>GND</sub> | DC V <sub>CC</sub> or Ground Current | ± 50                          | mA   |
| T <sub>stg</sub>                    | Storage Temperature                  | -65 to +150                   | °C   |
| T <sub>L</sub>                      | Lead Temperature (10 sec)            | 260                           | °C   |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

RECOMMENDED OPERATING CONDITIONS

| Symbol          | Parameter  | Value                | Unit |
|-----------------|--|----------------------|------|
| V <sub>CC</sub> | Supply Voltage   | 4.5 to 5.5           | V    |
| V <sub>I</sub>  | Input Voltage  | 0 to 5.5             | V    |
| V <sub>O</sub>  | Output Voltage   | 0 to V <sub>CC</sub> | V    |
| T <sub>op</sub> | Operating Temperature  | -40 to +85           | °C   |
| dt/dv           | Input Rise and Fall Time (see note 1) (V <sub>CC</sub> = 5.0 ± 0.5V) | 0 to 20              | ns/V |

1) V<sub>IN</sub> from 0.8V to 2 V



## DC SPECIFICATIONS

| Symbol           | Parameter                             | Test Conditions        |  | Value                  |      |       |              |      | Unit |
|------------------|---------------------------------------|------------------------|--|------------------------|------|-------|--------------|------|------|
|                  |                                       | V <sub>CC</sub><br>(V) |  | T <sub>A</sub> = 25 °C |      |       | -40 to 85 °C |      |      |
|                  |                                       |                        |  | Min.                   | Typ. | Max.  | Min.         | Max. |      |
| V <sub>IH</sub>  | High Level Input Voltage              | 4.5 to 5.5             |  | 2                      |      |       | 2            |      | V    |
| V <sub>IL</sub>  | Low Level Input Voltage               | 4.5 to 5.5             |  |                        |      | 0.8   |              | 0.8  | V    |
| V <sub>OL</sub>  | Low Level Output Voltage              | 4.5                    | I <sub>O</sub> =50 μA  |                        | 0.0  | 0.1   |              | 0.1  | V    |
|                  |                                       | 4.5                    | I <sub>O</sub> =8 mA   |                        |      | 0.36  |              | 0.44 |      |
| I <sub>OZ</sub>  | High Impedance Output Leakage Current | 5.5                    | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>V <sub>O</sub> = V <sub>CC</sub> or GND |                        |      | ±0.25 |              | ±2.5 | μA   |
| I <sub>I</sub>   | Input Leakage Current                 | 0 to 5.5               | V <sub>I</sub> = 5.5V or GND   |                        |      | ±0.1  |              | ±1.0 | μA   |
| I <sub>CC</sub>  | Quiescent Supply Current              | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND  |                        |      | 1     |              | 10   | μA   |
| ΔI <sub>CC</sub> | Additional Worst Case Supply Current  | 5.5                    | One Input at 3.4V,<br>other input at V <sub>CC</sub> or GND                                    |                        |      | 1.35  |              | 1.5  | mA   |

AC ELECTRICAL CHARACTERISTICS (Input t<sub>r</sub> = t<sub>f</sub> = 3 ns)

| Symbol           | Parameter         | Test Condition             |                        |                       | Value                  |      |      |              |      | Unit |
|------------------|-------------------|----------------------------|------------------------|-----------------------|------------------------|------|------|--------------|------|------|
|                  |                   | V <sub>CC</sub> (*)<br>(V) | C <sub>L</sub><br>(pF) |                       | T <sub>A</sub> = 25 °C |      |      | -40 to 85 °C |      |      |
|                  |                   |                            |                        |                       | Min.                   | Typ. | Max. | Min.         | Max. |      |
| t <sub>PLZ</sub> | Propagation Delay | 5.0                        | 15                     | R <sub>L</sub> = 1 KΩ |                        | 6.3  | 7.0  | 1.0          | 8.0  | ns   |
| t <sub>PZL</sub> | Time              | 5.0                        | 50                     | R <sub>L</sub> = 1 KΩ |                        | 7.0  | 8.0  | 1.0          | 9.0  |      |

(\*) Voltage range is 5V ± 0.5V

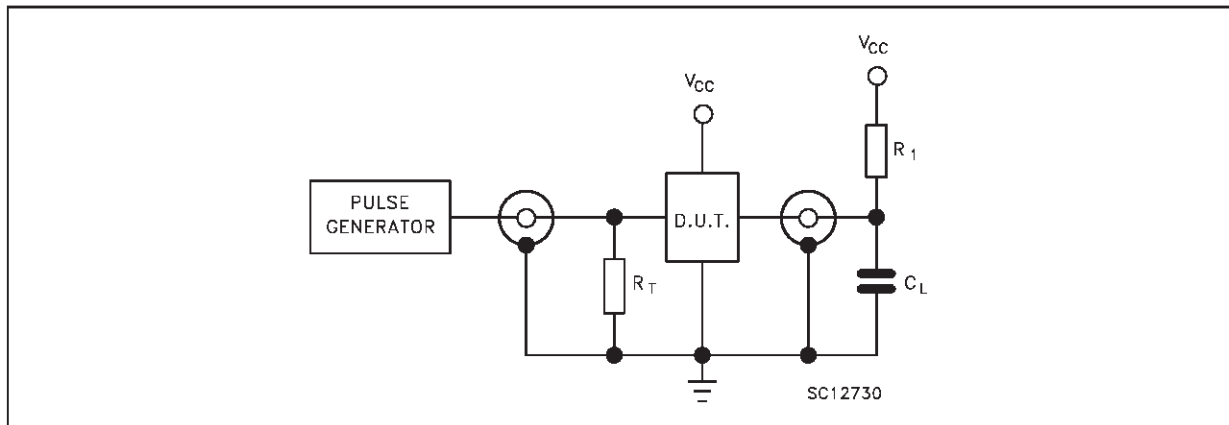
## CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Test Conditions | Value                  |      |      |              |    | Unit |
|------------------|--|-----------------|------------------------|------|------|--------------|----|------|
|                  |  |                 | T <sub>A</sub> = 25 °C |      |      | -40 to 85 °C |    |      |
|                  |  | Min.            | Typ.                   | Max. | Min. | Max.         |    |      |
| C <sub>IN</sub>  | Input Capacitance                      |                 |                        | 4    | 10   |              | 10 | pF   |
| C <sub>OUT</sub> | Output Capacitance                     |                 |                        | 5    |      |              |    | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance (note 1) |                 |                        | 10.5 |      |              |    | pF   |

1) C<sub>PD</sub> is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I<sub>CC(opr)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>IN</sub> + I<sub>CC</sub>



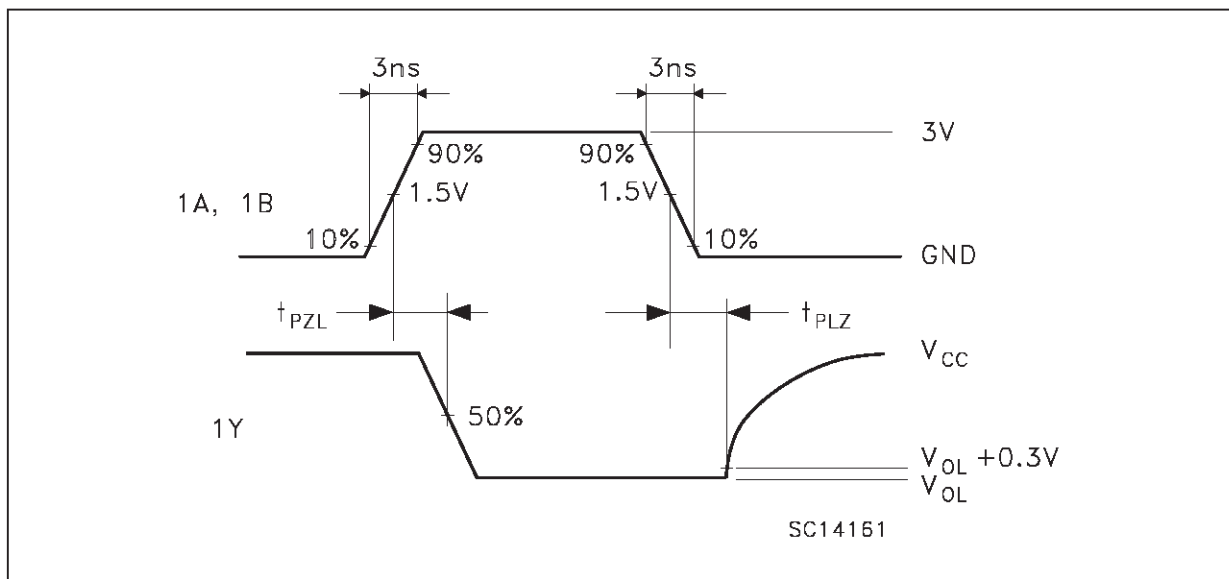
## TEST CIRCUIT



$C_L = 15/50$  pF or equivalent (includes jig and probe capacitance)

$R_L = R_1 = 1K\Omega$  or equivalent

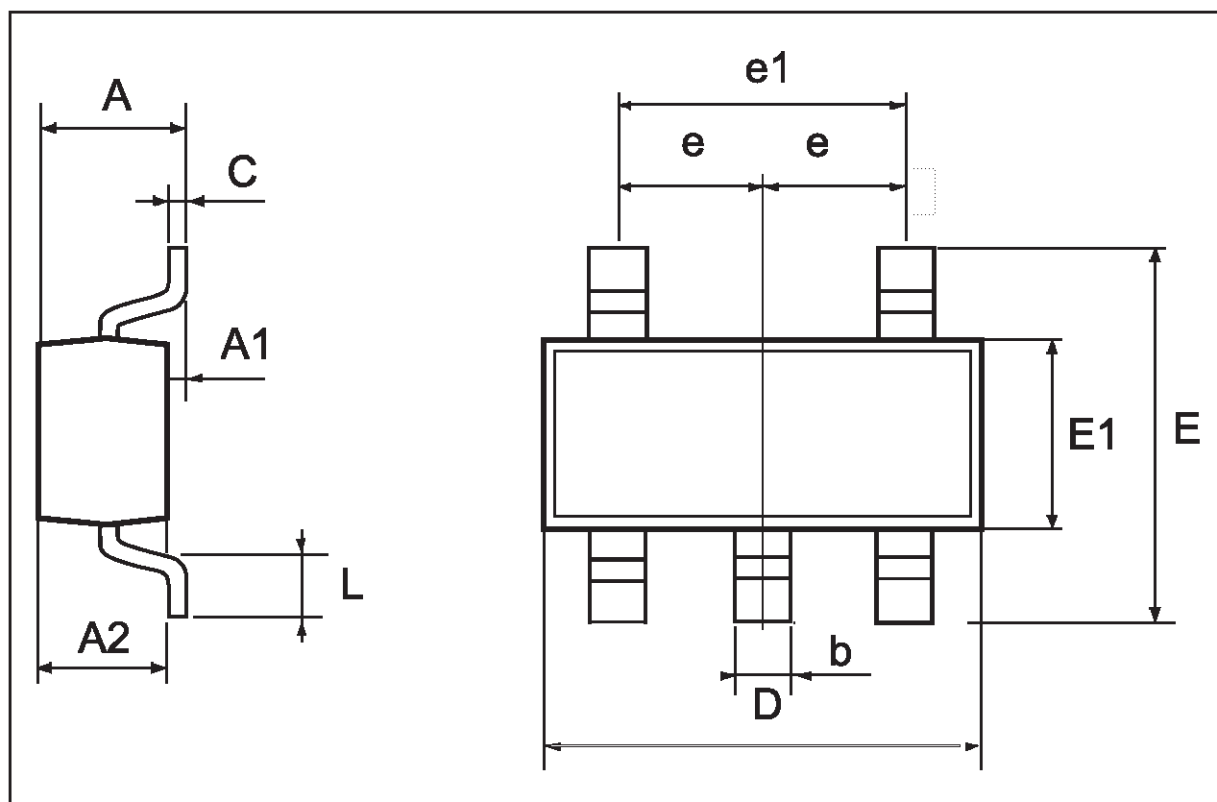
$R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

WAVEFORM: PROPAGATION DELAYS ( $f=1\text{MHz}$ ; 50% duty cycle)



## SOT23-5L MECHANICAL DATA

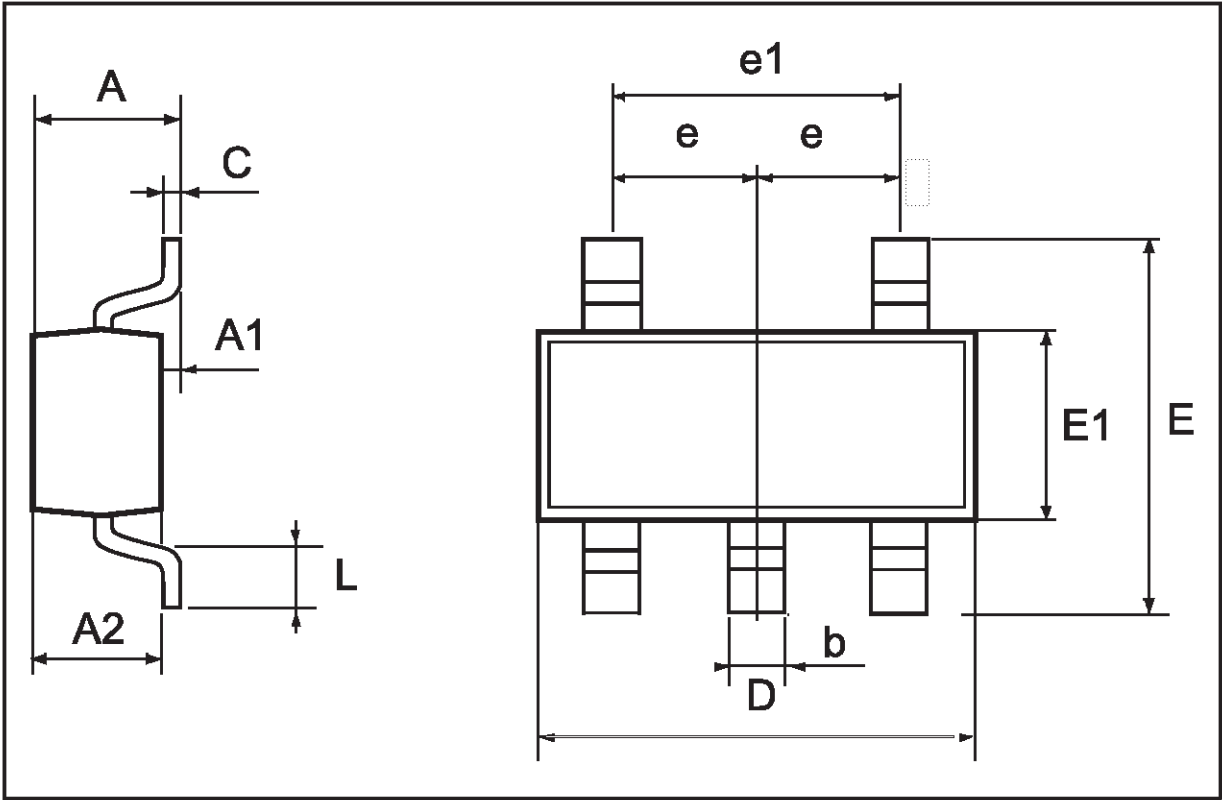
| DIM. | mm   |      |      | mils  |      |       |
|------|------|------|------|-------|------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP. | MAX.  |
| A    | 0.90 |      | 1.45 | 35.4  |      | 57.1  |
| A1   | 0.00 |      | 0.15 | 0.0   |      | 5.9   |
| A2   | 0.90 |      | 1.30 | 35.4  |      | 51.2  |
| b    | 0.35 |      | 0.50 | 13.7  |      | 19.7  |
| C    | 0.09 |      | 0.20 | 3.5   |      | 7.8   |
| D    | 2.80 |      | 3.00 | 110.2 |      | 118.1 |
| E    | 2.60 |      | 3.00 | 102.3 |      | 118.1 |
| E1   | 1.50 |      | 1.75 | 59.0  |      | 68.8  |
| L    | 0.35 |      | 0.55 | 13.7  |      | 21.6  |
| e    |      | 0.95 |      |       | 37.4 |       |
| e1   |      | 1.9  |      |       | 74.8 |       |





SC-70 MECHANICAL DATA

| DIM. | mm   |      |      | mils |      |      |
|------|------|------|------|------|------|------|
|      | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A    | 0.80 |      | 1.10 | 31.5 |      | 43.3 |
| A1   | 0.00 |      | 0.10 | 0.0  |      | 3.9  |
| A2   | 0.80 |      | 1.00 | 31.5 |      | 39.4 |
| b    | 0.15 |      | 0.30 | 5.9  |      | 11.8 |
| C    | 0.10 |      | 0.18 | 3.9  |      | 7.1  |
| D    | 1.80 |      | 2.20 | 70.9 |      | 86.6 |
| E    | 1.80 |      | 2.40 | 70.9 |      | 94.5 |
| E1   | 1.15 |      | 1.35 | 45.3 |      | 53.1 |
| L    | 0.10 |      | 0.30 | 3.9  |      | 11.8 |
| e    |      | 0.65 |      |      | 25.6 |      |
| e1   |      | 1.3  |      |      | 51.2 |      |





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