



# 74V2G03

## DUAL 2-INPUT OPEN DRAIN NAND GATE

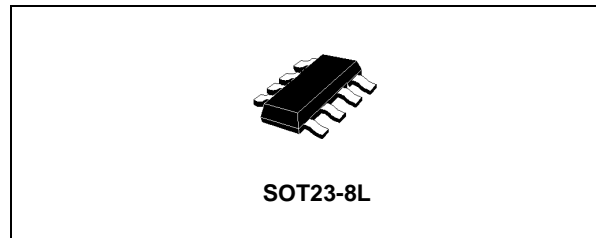
- HIGH SPEED:  $t_{PD} = 3.9ns$  (TYP.) at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 1\mu A$ (MAX.) at  $T_A = 25^\circ C$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (MIN.)
- POWER DOWN PROTECTION ON INPUTS
- OPERATING VOLTAGE RANGE:  
 $V_{CC}(OPR) = 2V$  to  $5.5V$
- IMPROVED LATCH-UP IMMUNITY

### DESCRIPTION

The 74V2G03 is an advanced high-speed CMOS DUAL 2-INPUT OPEN DRAIN NAND GATE fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

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

The device can, with an external pull-up resistor, be used in wired AND configuration. This device



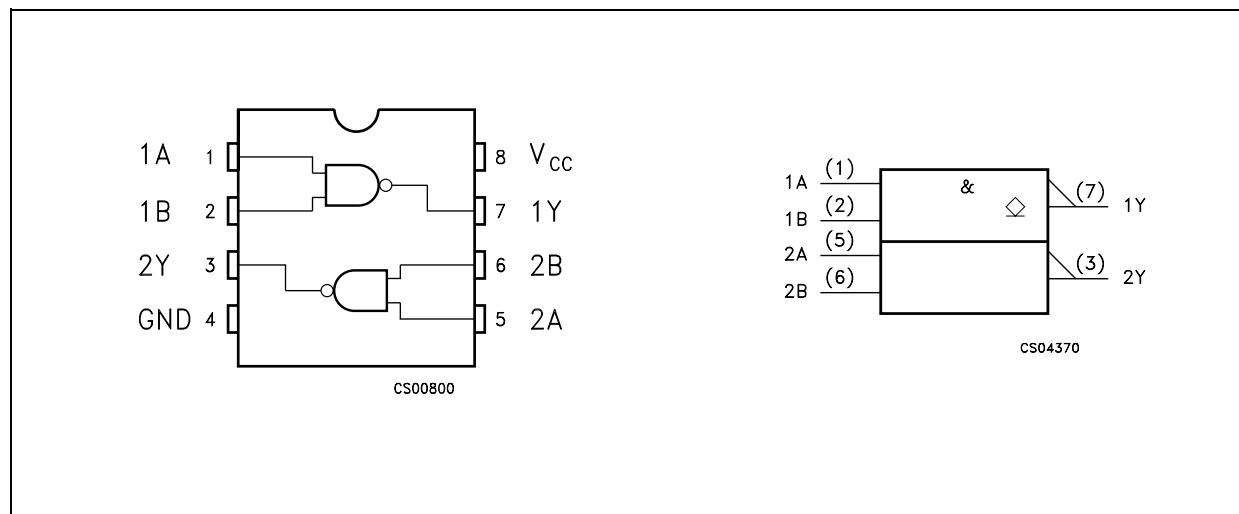
### ORDER CODES

| PACKAGE  | T & R      |
|----------|------------|
| SOT23-8L | 74V2G03STR |

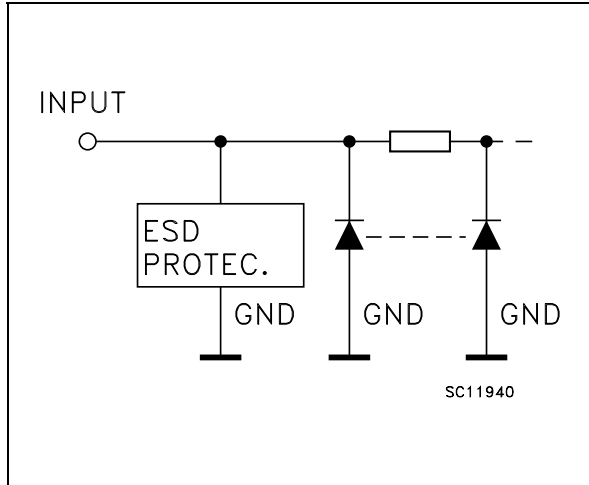
can also be used as a led driver in any other application requiring current sink.

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



**INPUT EQUIVALENT CIRCUIT**



**PIN DESCRIPTION**

| PIN N° | SYMBOL          | NAME QND FUNCTION       |
|--------|-----------------|-------------------------|
| 1, 5   | 1A, 2A          | Data Input              |
| 2, 6   | 1B, 2B          | Data Input              |
| 7, 3   | 1Y, 2Y          | Data Output             |
| 4      | GND             | Ground (0V)             |
| 8      | 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 conditions is not implied.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol          | Parameter  | Value                | Unit         |
|-----------------|--|----------------------|--------------|
| V <sub>CC</sub> | Supply Voltage   | 2 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  | -55 to 125           | °C           |
| dt/dv           | Input Rise and Fall Time (note 1) (V <sub>CC</sub> = 3.3 ± 0.3V)<br>(V <sub>CC</sub> = 5.0 ± 0.5V) | 0 to 100<br>0 to 20  | ns/V<br>ns/V |

1) V<sub>IN</sub> from 30% to 70% of V<sub>CC</sub>

## DC SPECIFICATIONS

| Symbol          | Parameter                             | Test Condition         |  | Value                 |      |                    |                    |                    |                    | Unit               |      |
|-----------------|---------------------------------------|------------------------|--|-----------------------|------|--------------------|--------------------|--------------------|--------------------|--------------------|------|
|                 |                                       | V <sub>CC</sub><br>(V) |  | T <sub>A</sub> = 25°C |      |                    | -40 to 85°C        |                    | -55 to 125°C       |                    |      |
|                 |                                       |                        |  | Min.                  | Typ. | Max.               | Min.               | Max.               | Min.               |                    | Max. |
| V <sub>IH</sub> | High Level Input Voltage              | 2.0                    |  | 1.5                   |      |                    | 1.5                |                    | 1.5                |                    | V    |
|                 |                                       | 3.0 to 5.5             |  | 0.7V <sub>CC</sub>    |      |                    | 0.7V <sub>CC</sub> |                    | 0.7V <sub>CC</sub> |                    |      |
| V <sub>IL</sub> | Low Level Input Voltage               | 2.0                    |  |                       |      | 0.5                |                    | 0.5                |                    | 0.5                | V    |
|                 |                                       | 3.0 to 5.5             |  |                       |      | 0.3V <sub>CC</sub> |                    | 0.3V <sub>CC</sub> |                    | 0.3V <sub>CC</sub> |      |
| V <sub>OL</sub> | Low Level Output Voltage              | 2.0                    | I <sub>O</sub> =50 μA  |                       | 0.0  | 0.1                |                    | 0.1                |                    | 0.1                | V    |
|                 |                                       | 3.0                    | I <sub>O</sub> =50 μA  |                       | 0.0  | 0.1                |                    | 0.1                |                    | 0.1                |      |
|                 |                                       | 4.5                    | I <sub>O</sub> =50 μA  |                       | 0.0  | 0.1                |                    | 0.1                |                    | 0.1                |      |
|                 |                                       | 3.0                    | I <sub>O</sub> =4 mA   |                       |      | 0.36               |                    | 0.44               |                    | 0.55               |      |
|                 |                                       | 4.5                    | I <sub>O</sub> =8 mA   |                       |      | 0.36               |                    | 0.44               |                    | 0.55               |      |
| 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              |                    | ± 5                | μA   |
| I <sub>I</sub>  | Input Leakage Current                 | 0 to 5.5               | V <sub>I</sub> = 5.5V or GND   |                       |      | ± 0.1              |                    | ± 1                |                    | ± 1                | μA   |
| I <sub>CC</sub> | Quiescent Supply Current              | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND  |                       |      | 1                  |                    | 10                 |                    | 20                 | μA   |

## AC ELECTRICAL CHARACTERISTICS

| 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 |      | -55 to 125°C |      |      |
|                  |                        |                        |                        | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| t <sub>PZL</sub> | Propagation Delay Time | 3.3(*)                 | 15                     |                       | 4.8  | 6.5  | 1.0         | 8.0  | 1.0          | 9.0  | ns   |
|                  |                        | 3.3(*)                 | 50                     |                       | 5.3  | 7.5  | 1.0         | 9.0  | 1.0          | 10.0 |      |
|                  |                        | 5.0(**)                | 15                     |                       | 3.9  | 5.5  | 1.0         | 6.5  | 1.0          | 7.5  |      |
|                  |                        | 5.0(**)                | 50                     |                       | 4.3  | 6.0  | 1.0         | 7.5  | 1.0          | 8.5  |      |
| t <sub>PLZ</sub> | Propagation Delay Time | 3.3(*)                 | 50                     |                       | 6.8  | 9.5  | 1.0         | 10.0 | 1.0          | 11.0 | ns   |
|                  |                        | 5.0(**)                | 50                     |                       | 4.8  | 6.5  | 1.0         | 7.0  | 1.0          | 8.0  |      |

(\*) Voltage range is 3.3V ± 0.3V

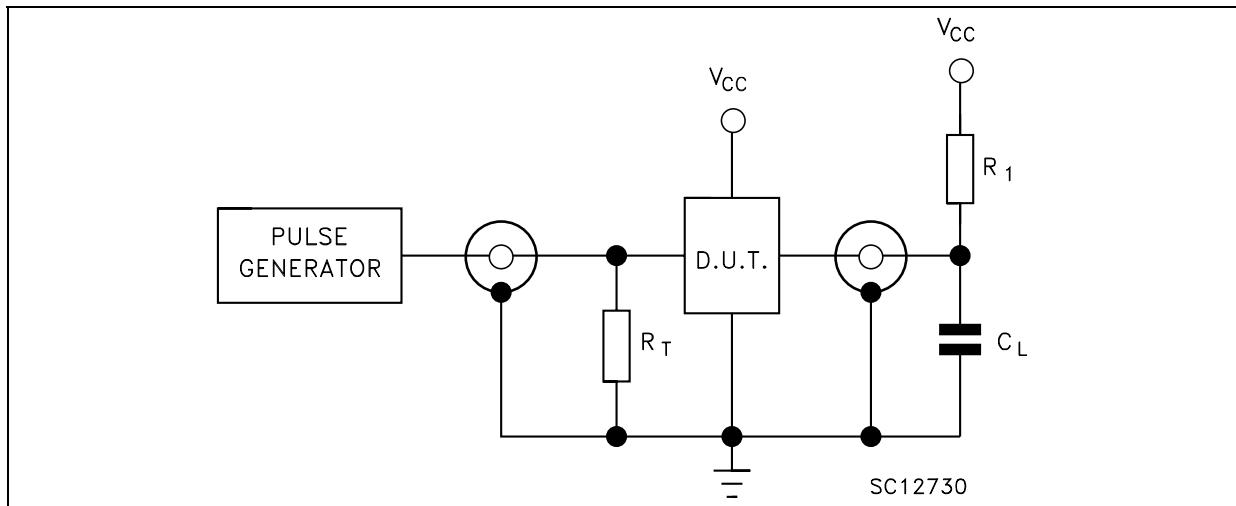
(\*\*) Voltage range is 5.0V ± 0.5V

CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Test Condition | Value                 |      |      |             |      |              | Unit |      |
|------------------|--|----------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                  |  |                | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                  |  |                | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| C <sub>IN</sub>  | Input Capacitance                      |                |                       | 4    | 10   |             | 10   |              | 10   | pF   |
| C <sub>OUT</sub> | Output Capacitance                     |                |                       | 5    | 10   |             | 10   |              | 10   | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance (note 1) |                |                       | 3    |      |             |      |              |      | pF   |

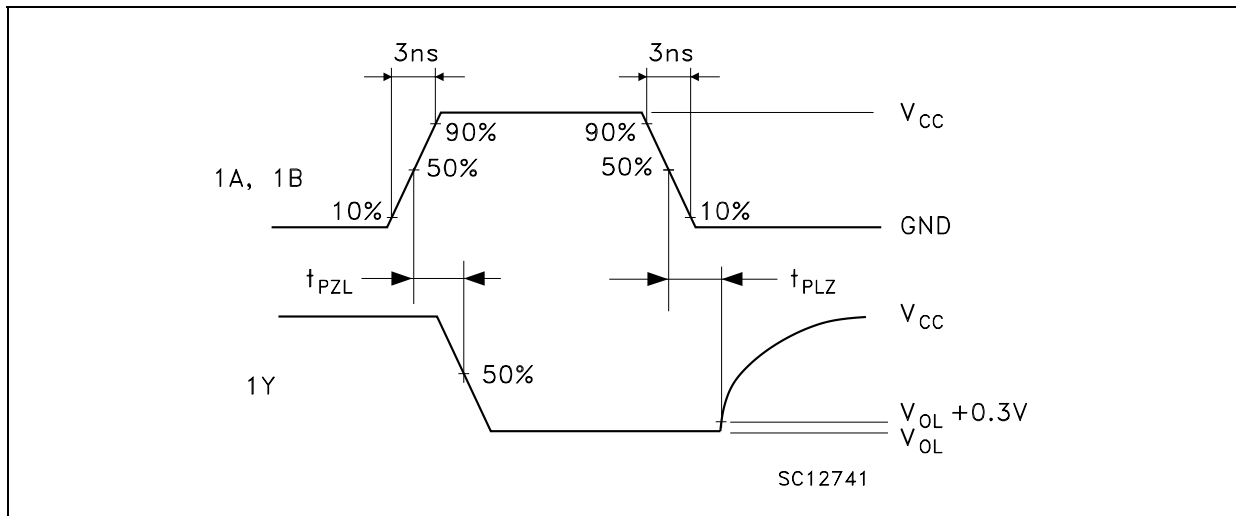
1) C<sub>PD</sub> is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/2$

TEST CIRCUIT



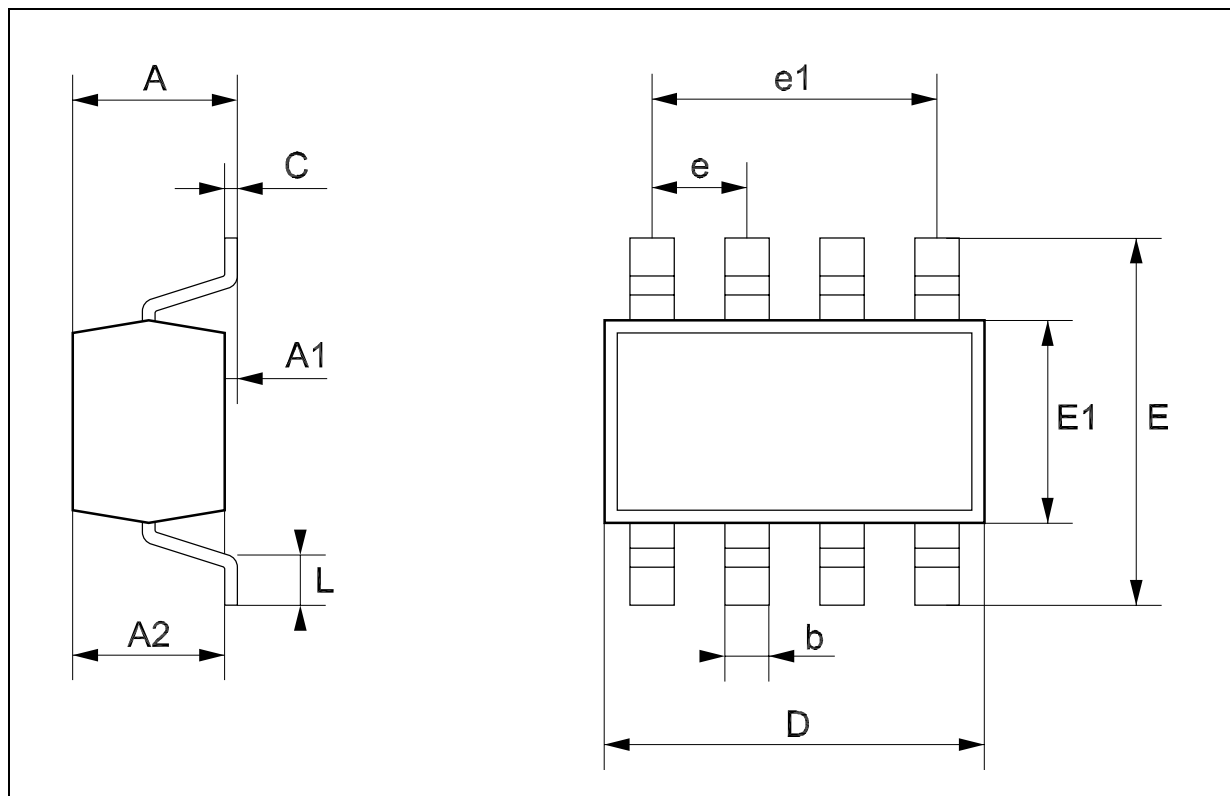
C<sub>L</sub> = 15/50pF or equivalent (includes jig and probe capacitance)  
 R<sub>1</sub> = 1KΩ or equivalent  
 R<sub>T</sub> = Z<sub>OUT</sub> of pulse generator (typically 50Ω)

WAVEFORM: PROPAGATION DELAY (f=1MHz; 50% duty cycle)



## SOT23-8L 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    | 0.22 |      | 0.38 | 8.6   |      | 14.9  |
| 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  |
| e    | 0    | .65  |      |       | 25.6 |       |
| e1   |      | 1.95 |      |       | 76.7 |       |
| L    | 0.35 |      | 0.55 | 13.7  |      | 21.6  |



## Tape &amp; Reel SOT23-xL MECHANICAL DATA

| DIM. | mm.  |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      |      | 180  |       |       | 7.086 |
| C    | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D    | 20.2 |      |      | 0.795 |       |       |
| N    | 60   |      |      | 2.362 |       |       |
| T    |      |      | 14.4 |       |       | 0.567 |
| Ao   | 3.13 | 3.23 | 3.33 | 0.123 | 0.127 | 0.131 |
| Bo   | 3.07 | 3.17 | 3.27 | 0.120 | 0.124 | 0.128 |
| Ko   | 1.27 | 1.37 | 1.47 | 0.050 | 0.054 | 0.058 |
| Po   | 3.9  | 4.0  | 4.1  | 0.153 | 0.157 | 0.161 |
| P    | 3.9  | 4.0  | 4.1  | 0.153 | 0.157 | 0.161 |



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>