

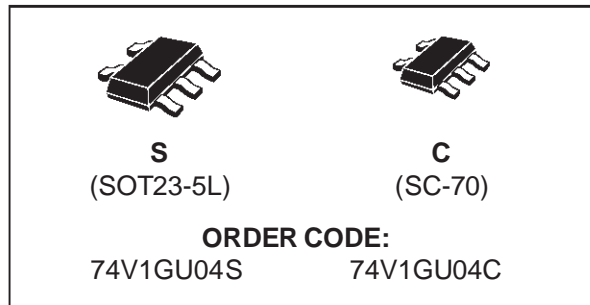


SINGLE INVERTER (SINGLE STAGE)

- HIGH SPEED: $t_{PD} = 3.5 \text{ ns}$ (TYP.) at $V_{CC} = 5V$
- LOW POWER DISSIPATION:
 $I_{CC} = 1 \mu\text{A}$ (MAX.) at $T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:
 $V_{NIH} = V_{NIL} = 10\% V_{CC}$ (MIN.)
- POWER DOWN PROTECTION ON INPUT
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 8 \text{ mA}$ (MIN.)
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 2V to 5.5V
- IMPROVED LATCH-UP IMMUNITY

DESCRIPTION

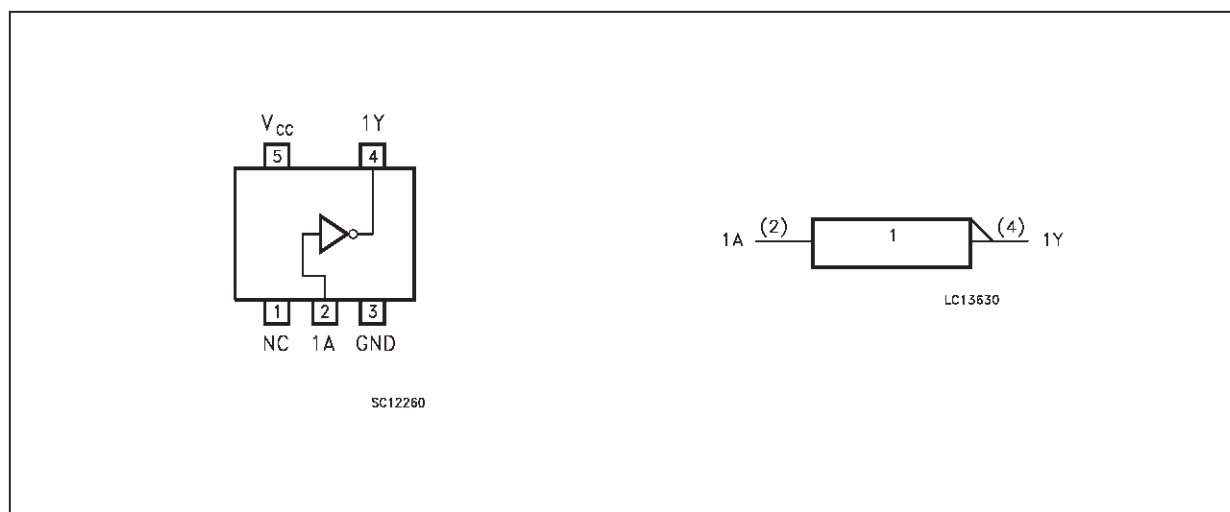
The 74V1GU04 is an advanced high-speed CMOS SINGLE INVERTER fabricated with sub-micron silicon gate and double-layer metal wiring C²MOS technology.



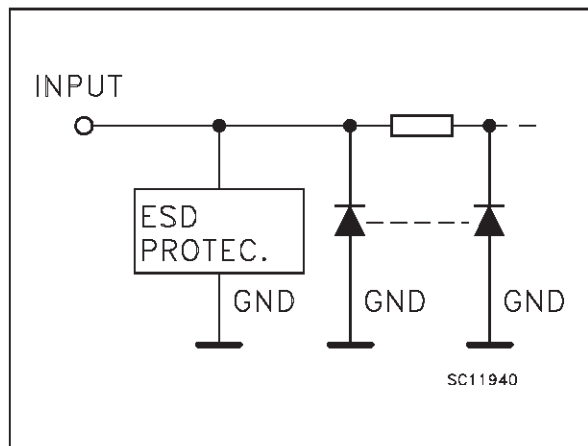
As the internal circuit is composed of a single stage inverter, it can be used in analog application such a crystal oscillator.

Power down protection is provided on input and 0 to 7V can be accepted on input 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 No | SYMBOL | NAME AND FUNCTION |
|--------|-----------------|-------------------------|
| 1 | N.C. | Not Connected |
| 2 | 1A | Data Input |
| 4 | 1Y | Data Output |
| 3 | GND | Ground (0V) |
| 5 | V _{CC} | Positive Supply Voltage |

TRUTH TABLE

| A | Y |
|---|---|
| L | H |
| H | L |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-------------------------------------|--------------------------------------|-------------------------------|------|
| V _{CC} | Supply Voltage | -0.5 to +7.0 | V |
| V _I | DC Input Voltage | -0.5 to +7.0 | V |
| V _O | DC Output Voltage | -0.5 to V _{CC} + 0.5 | V |
| I _{IK} | DC Input Diode Current | - 20 | mA |
| I _{OK} | DC Output Diode Current | ± 20 | mA |
| I _O | DC Output Current | ± 25 | mA |
| I _{CC} or I _{GND} | DC V _{CC} or Ground Current | ± 50 | mA |
| T _{stg} | Storage Temperature | -65 to +150 | °C |
| T _L | 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 _{CC} | Supply Voltage | 2.0 to 5.5 | V |
| V _I | Input Voltage | 0 to 5.5 | V |
| V _O | Output Voltage | 0 to V _{CC} | V |
| T _{op} | Operating Temperature | -40 to +85 | °C |

DC SPECIFICATIONS

| Symbol | Parameter | Test Conditions | | Value | | | | | Unit | |
|-----------------|---------------------------|-----------------|---|------------------------|------------------------|--------------------|--------------------|--------------------|------|------|
| | | | | V _{CC} (V) | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | | Min. | Typ. | Max. | Min. | | Max. |
| V _{IH} | High Level Input Voltage | 2.0 | | 1.7 | | | 1.7 | | V | |
| | | 3.0 to 5.5 | | 0.8V _{CC} | | | 0.8V _{CC} | | | |
| V _{IL} | Low Level Input Voltage | 2.0 | | | | 0.3 | | 0.3 | V | |
| | | 3.0 to 5.5 | | | | 0.2V _{CC} | | 0.2V _{CC} | | |
| V _{OH} | High Level Output Voltage | 2.0 | I _O =-50 μA | 1.8 | 2.0 | | 1.8 | | V | |
| | | 3.0 | I _O =-50 μA | 2.7 | 3.0 | | 2.7 | | | |
| | | 4.5 | I _O =-50 μA | 4.0 | 4.5 | | 4.0 | | | |
| | | 3.0 | I _O =-4 mA | 2.58 | | | 2.48 | | | |
| | | 4.5 | I _O =-8 mA | 3.94 | | | 3.8 | | | |
| V _{OL} | Low Level Output Voltage | 2.0 | I _O =50 μA | | 0.0 | 0.2 | | 0.2 | V | |
| | | 3.0 | I _O =50 μA | | 0.0 | 0.3 | | 0.3 | | |
| | | 4.5 | I _O =50 μA | | 0.0 | 0.5 | | 0.5 | | |
| | | 3.0 | I _O =4 mA | | | 0.36 | | 0.44 | | |
| | | 4.5 | I _O =8 mA | | | 0.36 | | 0.44 | | |
| I _I | Input Leakage Current | 0 to 5.5 | V _I = 5.5V or GND | | | ±0.1 | | ±1.0 | μA | |
| I _{CC} | Quiescent Supply Current | 5.5 | V _I = V _{CC} or GND | | | 1 | | 10 | μA | |

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3 ns)

| Symbol | Parameter | Test Condition | | Value | | | | | Unit | | |
|--------------------------------------|------------------------|---------------------|----|------------------------|------------------------|------------------------|------|------|------|--------------|------|
| | | | | V _{CC} (V) | C _L (pF) | T _A = 25 °C | | | | -40 to 85 °C | |
| | | | | | | Min. | Typ. | Max. | | Min. | Max. |
| t _{PLH} t _{PHL} | Propagation Delay Time | 3.3 ^(*) | 15 | | 5.0 | 8.9 | 1.0 | 10.5 | ns | | |
| | | 3.3 ^(*) | 50 | | 7.5 | 11.4 | 1.0 | 13.0 | | | |
| | | 5.0 ^(**) | 15 | | 3.5 | 5.5 | 1.0 | 6.5 | | | |
| | | 5.0 ^(**) | 50 | | 5.0 | 7.0 | 1.0 | 8.0 | | | |

(*) Voltage range is 3.3V ± 0.3V

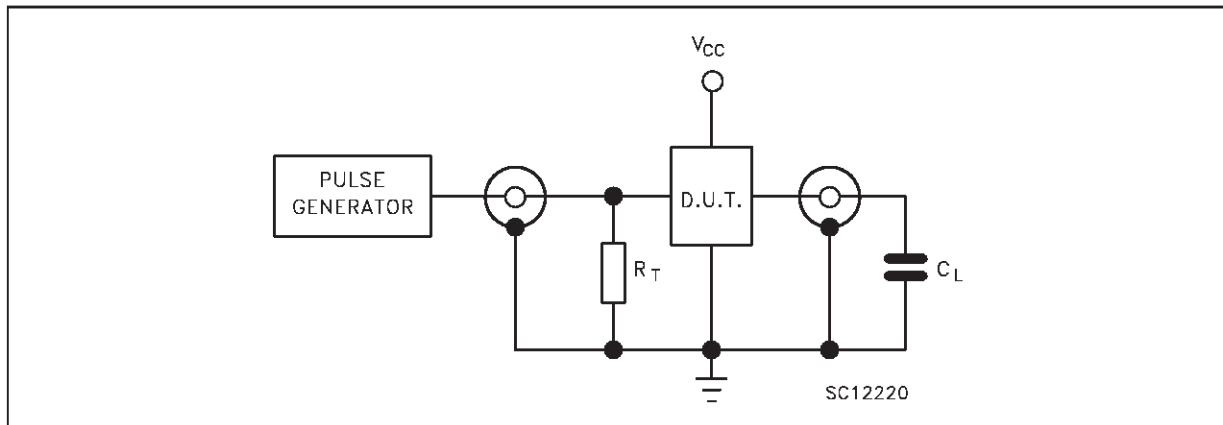
(**) Voltage range is 5V ± 0.5V

CAPACITIVE CHARACTERISTICS

| Symbol | Parameter | Test Conditions | | Value | | | | | Unit | |
|-----------------|--|-----------------|--|-------|------------------------|------|------|--------------|------|------|
| | | | | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | | Min. | Typ. | Max. | Min. | | Max. |
| C _{IN} | Input Capacitance | | | 5 | 10 | | | 10 | pF | |
| C _{PD} | Power Dissipation Capacitance (note 1) | | | 9 | | | | | pF | |

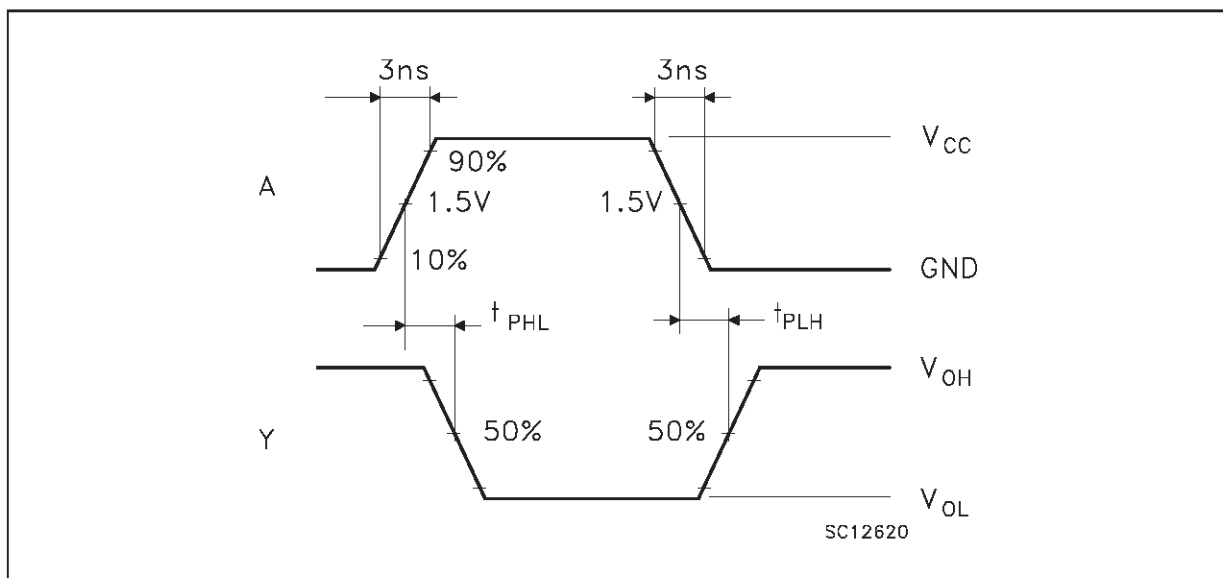
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I_{CC}(opr) = C_{PD} • V_{CC} • f_{IN} + I_{CC}

TEST CIRCUIT



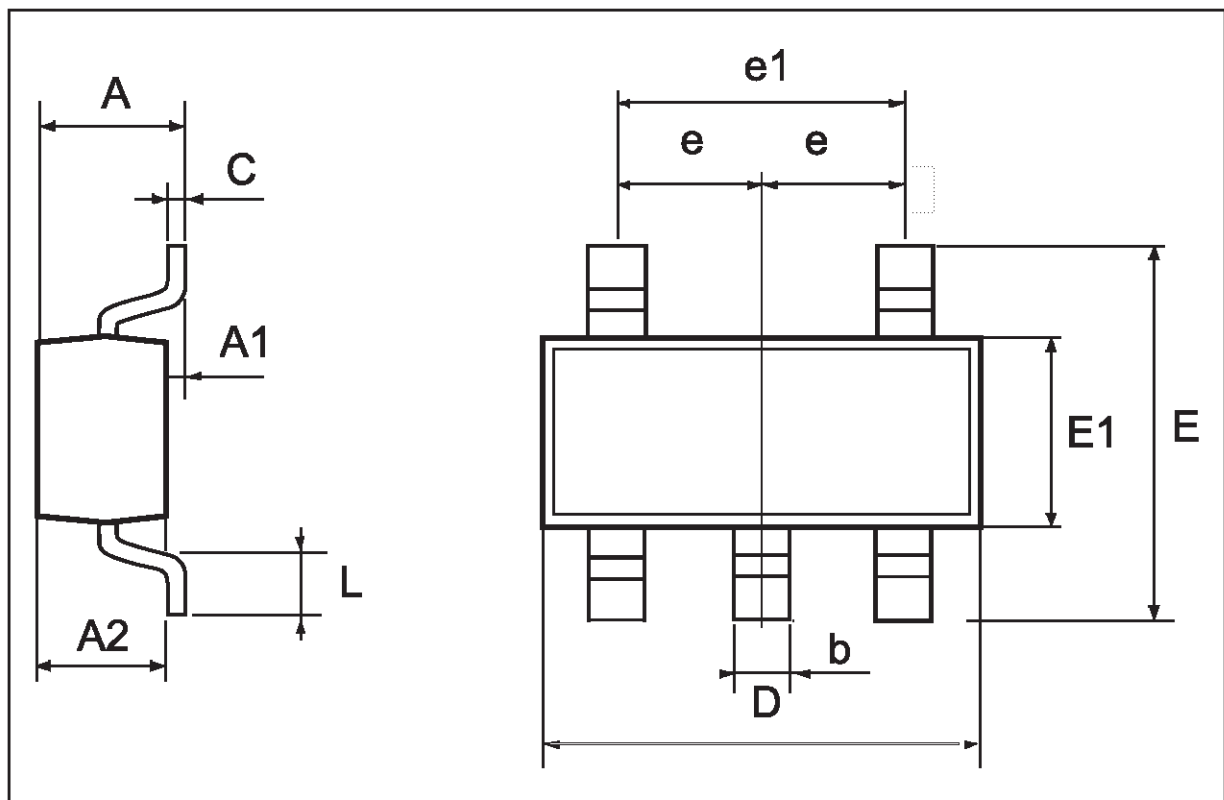
$C_L = 15/50$ pF or equivalent (includes jig and probe capacitance)
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

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



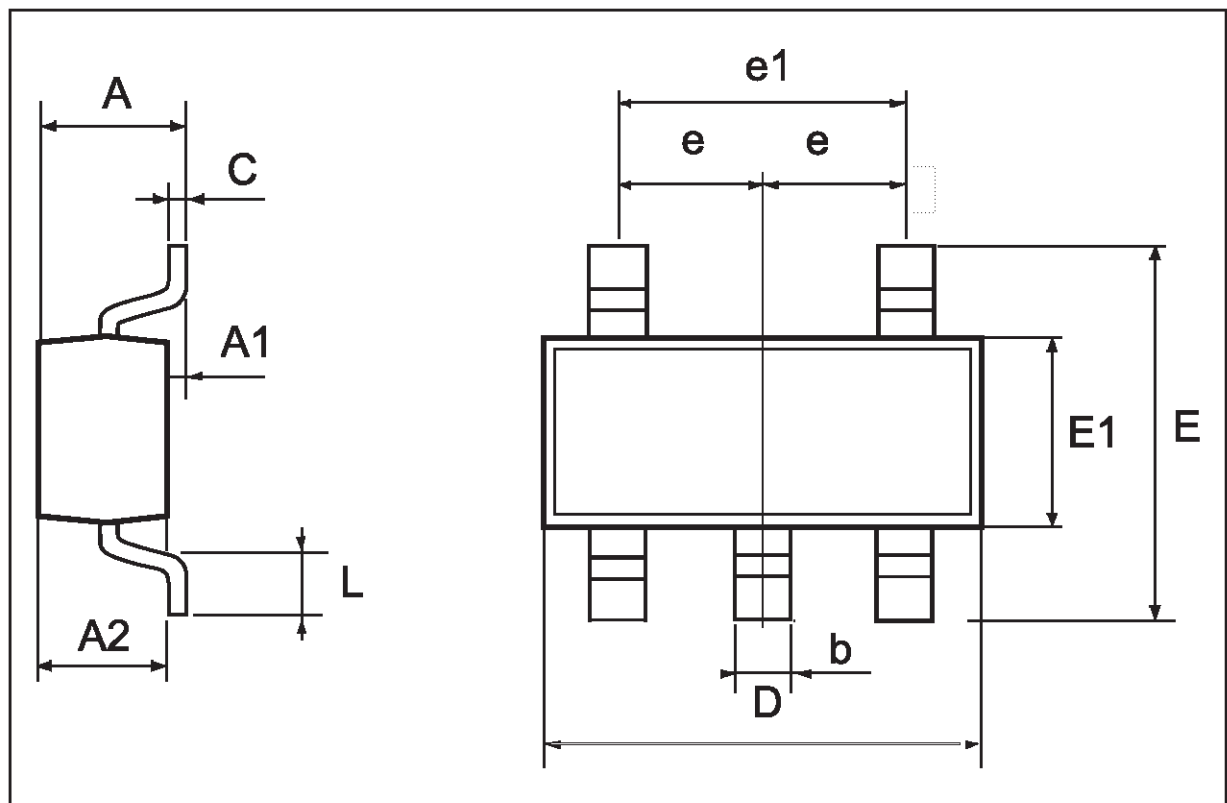
SOT23-5L MECHANICAL DATA

| 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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