



SINGLE INVERTER (OPEN DRAIN)

- HIGH SPEED: $t_{PD} = 3.7 \text{ ns}$ (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:
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (MIN.)
- POWER DOWN PROTECTION ON INPUT
- OPERATING VOLTAGE RANGE:
 $V_{CC} \text{ (OPR)} = 2V \text{ to } 5.5V$
- IMPROVED LATCH-UP IMMUNITY

DESCRIPTION

The 74V1G05 is an advanced high-speed CMOS SINGLE INVERTER (OPEN DRAIN) fabricated with sub-micron silicon gate and double-layer metal wiring C²MOS technology.

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

PRELIMINARY DATA



S
(SOT23-5L)



C
(SC-70)

ORDER CODE:

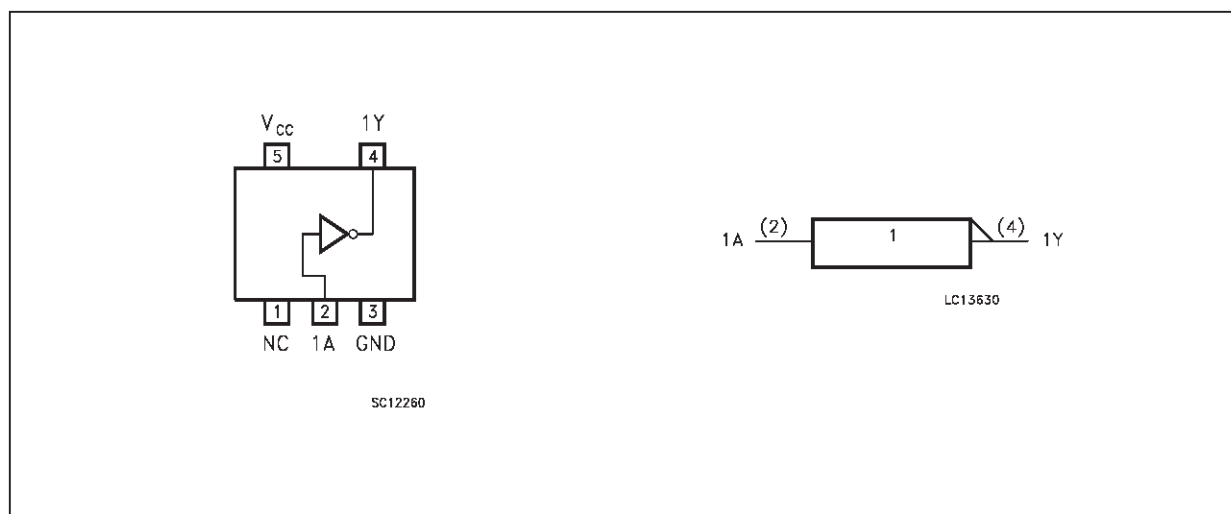
74V1G05S

74V1G05C

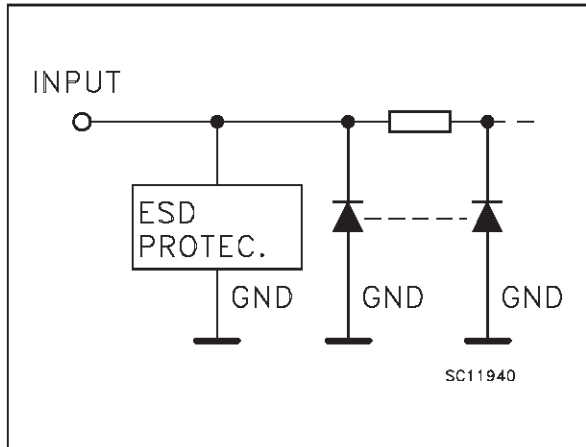
immunity and stable output.

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 | Z |
| H | L |

Z: High Impedance

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 |
| dt/dv | Input Rise and Fall Time (see note 1) (V _{CC} = 3.3 ± 0.3V) (V _{CC} = 5.0 ± 0.5V) | 0 to 100 0 to 20 | ns/V ns/V |

1) V_{IN} from 30% to 70% of V_{CC}

DC SPECIFICATIONS

| Symbol | Parameter | Test Conditions | | Value | | | | | Unit |
|-----------------|---------------------------------------|-----------------|--|------------------------|------|--------------------|--------------------|--------------------|------|
| | | | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | |
| V _{IH} | High Level Input Voltage | 2.0 | | 1.5 | | | 1.5 | | V |
| | | 3.0 to 5.5 | | 0.7V _{CC} | | | 0.7V _{CC} | | |
| V _{IL} | Low Level Input Voltage | 2.0 | | | | 0.5 | | 0.5 | V |
| | | 3.0 to 5.5 | | | | 0.3V _{CC} | | 0.3V _{CC} | |
| V _{OL} | Low Level Output Voltage | 2.0 | I _O =50 μA | | 0.0 | 0.1 | | 0.1 | V |
| | | 3.0 | I _O =50 μA | | 0.0 | 0.1 | | 0.1 | |
| | | 4.5 | I _O =50 μA | | 0.0 | 0.1 | | 0.1 | |
| | | 3.0 | I _O =4 mA | | | 0.36 | | 0.44 | |
| | | 4.5 | I _O =8 mA | | | 0.36 | | 0.44 | |
| I _{OZ} | High Impedance Output Leakage Current | 5.5 | V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND | | | ±0.25 | | ±2.5 | μA |
| 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 | | | 2 | | 20 | μA |

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

| Symbol | Parameter | Test Condition | | | Value | | | | | Unit |
|------------------|------------------------|---------------------|----|-----------------------|------------------------|------|------|--------------|------|------|
| | | | | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | | | | Min. | Typ. | Max. | Min. | Max. | |
| t _{PZL} | Propagation Delay Time | 3.3 ^(*) | 15 | R _L = 1 KΩ | | 5.5 | 7.9 | 1.0 | 9.5 | ns |
| | | 3.3 ^(*) | 50 | R _L = 1 KΩ | | 8.0 | 11.4 | 1.0 | 13.0 | |
| | | 5.0 ^(**) | 15 | R _L = 1 KΩ | | 3.7 | 5.5 | 1.0 | 6.5 | |
| | | 5.0 ^(**) | 50 | R _L = 1 KΩ | | 5.2 | 7.5 | 1.0 | 8.5 | |
| t _{PLZ} | Propagation Delay Time | 3.3 ^(*) | 50 | R _L = 1 KΩ | | 9.0 | 11.4 | 1.0 | 13.0 | ns |
| | | 5.0 ^(**) | 50 | R _L = 1 KΩ | | 6.0 | 7.5 | 1.0 | 8.5 | |

(*) Voltage range is 3.3V ± 0.3V

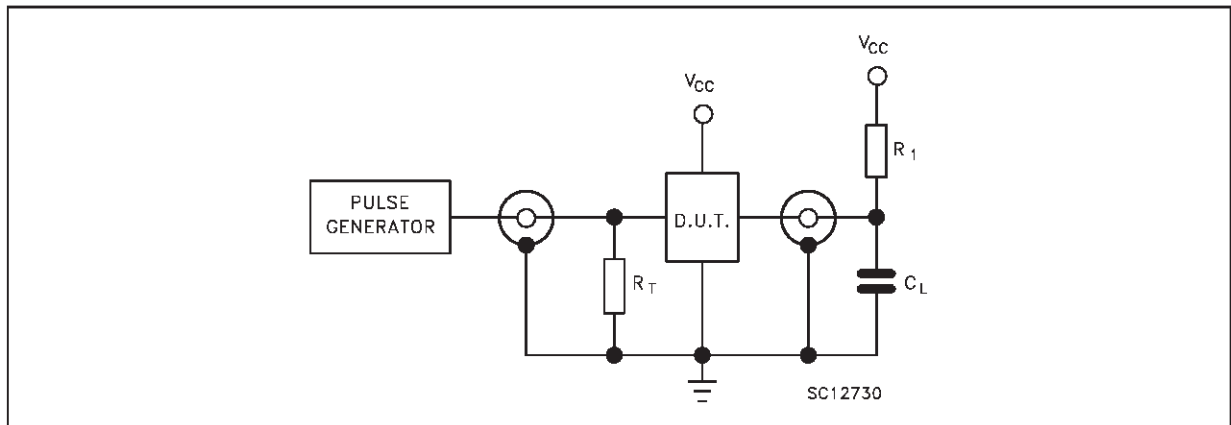
(**) Voltage range is 5V ± 0.5V

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 | | 4 | 10 | | | 10 | pF | |
| C _{OUT} | Output Capacitance | | 5 | | | | | pF | |
| C _{PD} | Power Dissipation Capacitance (note 1) | | 6 | | | | | pF | |

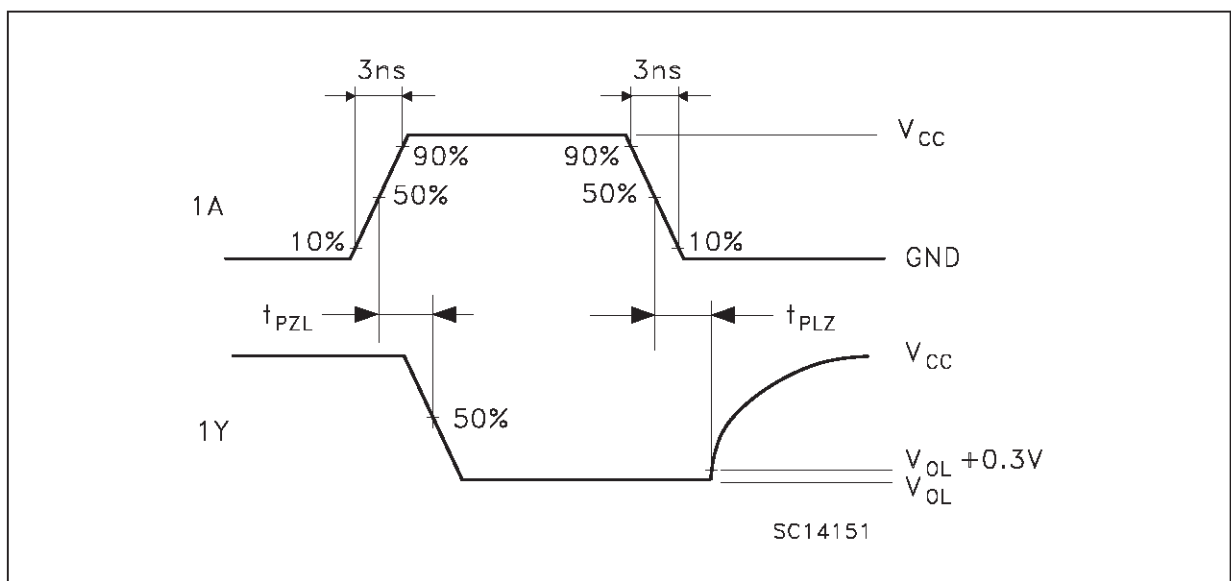
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I_{CC(OPR)} = C_{PD} • V_{CC} • f_{IN} + I_{CC}

TEST CIRCUIT



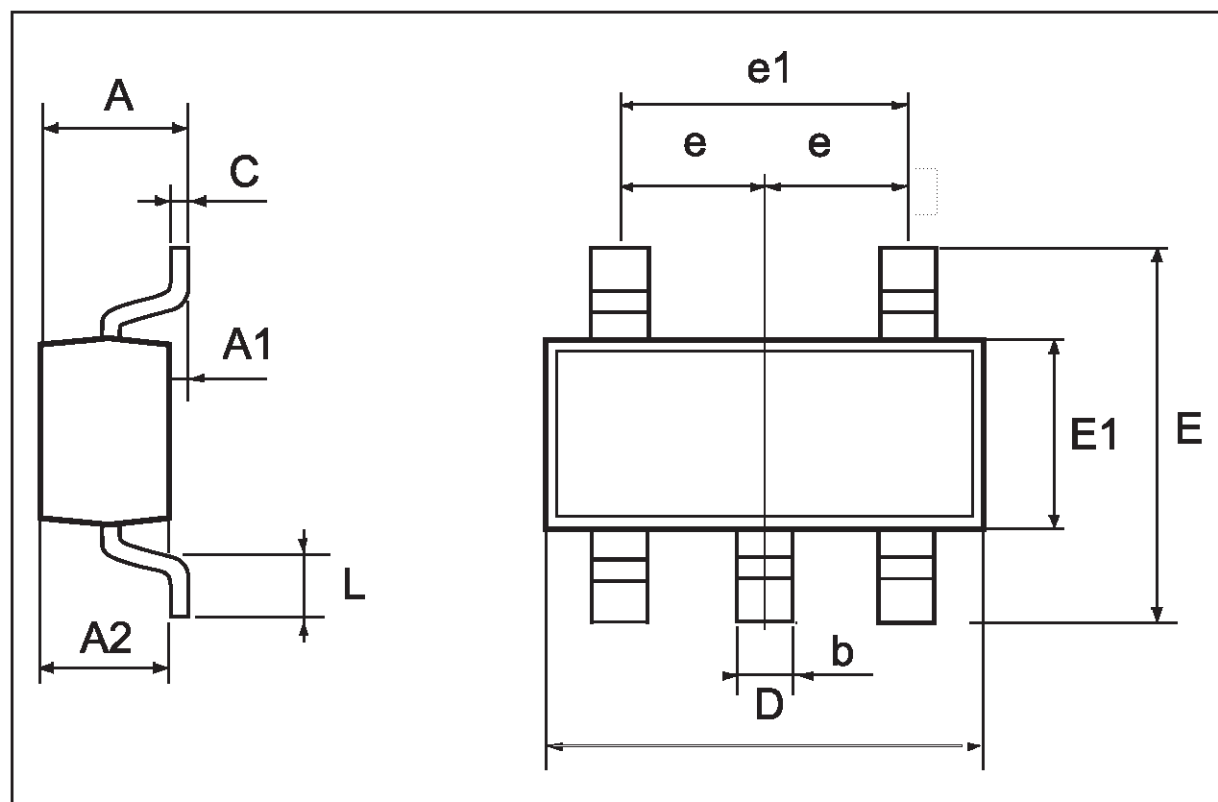
$C_L = 15/50$ pF or equivalent (includes jig and probe capacitance)
 $R_L = R_1 = 1K\Omega$ or equivalent
 $R_T = Z_{out}$ of pulse generator (typically 50Ω)

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



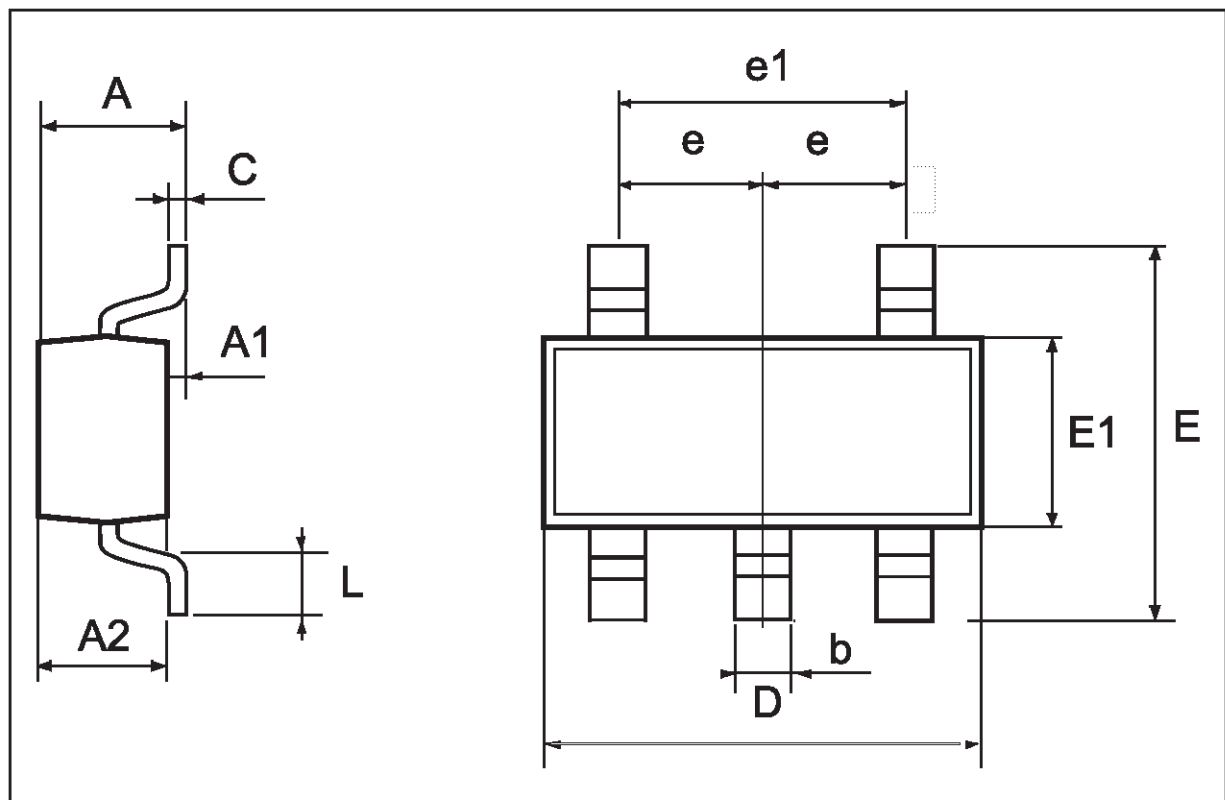
SOT23-5L MECHANICAL DATA

| 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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