

SINGLE BILATERAL SWITCH

- HIGH SPEED: $t_{PD} = 4 \text{ ns}$ (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.)
- LOW "ON" RESISTANCE
 $R_{ON} = 50\Omega$ (TYP.) AT $V_{CC}=9V I_{I/O}=100\mu A$
- SINE WAVE DISTORTION
 0.042% (TYP.) AT $V_{CC}=4V f=1KHz$
- WIDE OPERATING VOLTAGE RANGE:
 $V_{CC} \text{ (OPR)} = 2V \text{ to } 12V$

DESCRIPTION

The 74H1G66 is an high-speed CMOS SINGLE BILATERAL SWITCH fabricated in silicon gate C²MOS technology. It has high speed



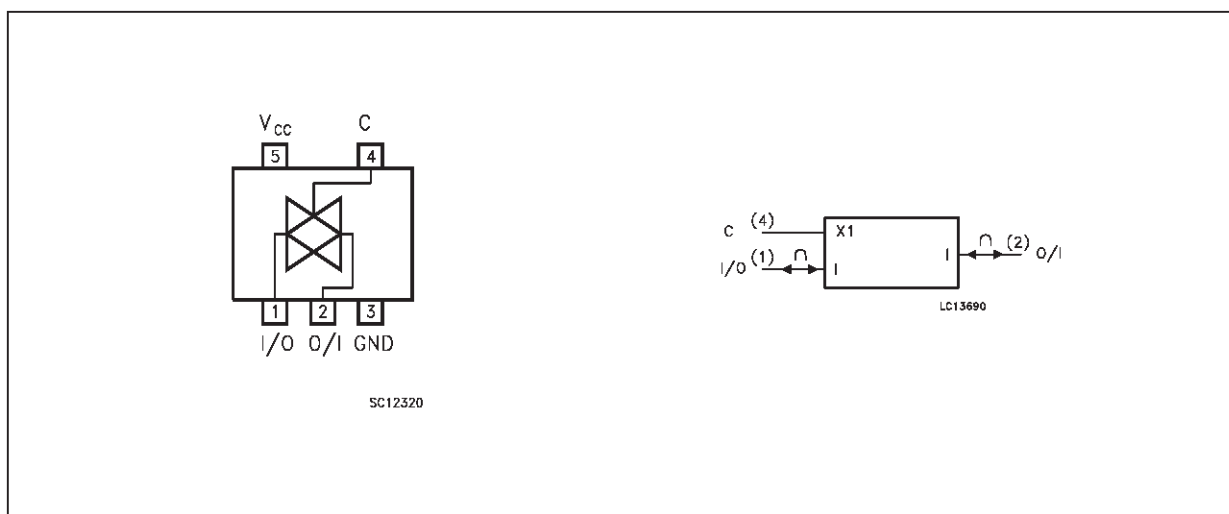
S
(SOT23-5L)

ORDER CODES :
74H1G66S

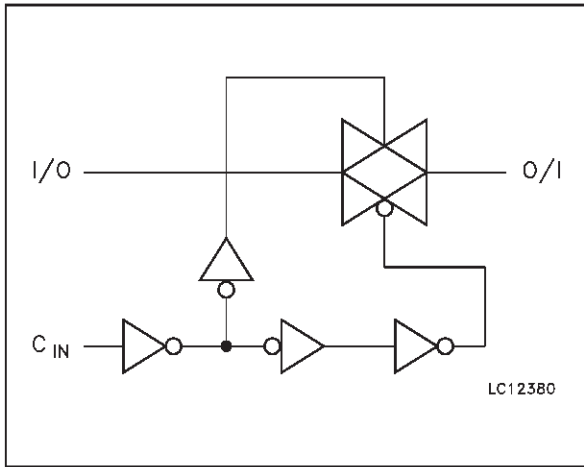
performance combined with true CMOS low power consumption.

The C input is provided to control the switch; the switch is ON when the C input is held high and off when C is held low.

PIN CONNECTION AND IEC LOGIC SYMBOLS



LOGIC DIAGRAM



PIN DESCRIPTION

| PIN No | SYMBOL | NAME AND FUNCTION |
|--------|-----------------|----------------------------|
| 1 | I/O | Independent Input/Output |
| 2 | O/I | Independent Output/Input |
| 4 | C | Enable Input (Active HIGH) |
| 3 | GND | Ground (0V) |
| 5 | V _{CC} | Positive Supply Voltage |

TRUTH TABLE

| CONTROL | SWITCH FUNCTION |
|---------|-----------------|
| H | ON |
| L | OFF |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-------------------------------------|--|-------------------------------|------|
| V _{CC} | Supply Voltage | -0.5 to +13 | V |
| V _I | DC Input Voltage | -0.5 to V _{CC} +0.5 | V |
| V _{I/O} | DC Input/Output Voltage | -0.5 to V _{CC} + 0.5 | V |
| I _{IK} | Control Input DC Diode Current | ± 20 | mA |
| I _{I/OK} | Input/Output DC Diode Current | ± 20 | mA |
| I _O | DC Output Source Sink Current Per Output Pin | ± 25 | mA |
| I _{CC} or I _{GND} | DC V _{CC} or Ground Current | ± 50 | mA |
| P _D | Power Dissipation | 500 (*) | mW |
| T _{stg} | Storage Temperature | -65 to +150 | °C |
| T _L | Lead Temperature (10 sec) | 300 | °C |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.
 (*)500mW: = 65 °C derate to 300 mW by 10 mW/°C: 65 °C to 85 °C

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Value | Unit | | | | | | | | |
|---------------------------------|--------------------------|---|----------------------|-----------|------------------------|----------|----------------------|----------|-----------------------|----------|----|
| V _{CC} | Supply Voltage | 2.0 to 12 | V | | | | | | | | |
| V _I | Input Voltage (Control) | 0 to V _{CC} | V | | | | | | | | |
| V _{I/O} | Input/Output Voltage | 0 to V _{CC} | V | | | | | | | | |
| T _{op} | Operating Temperature | -40 to +85 | °C | | | | | | | | |
| t _r , t _f | Input Rise and Fall Time | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>V_{CC} = 2V</td> <td>0 to 1000</td> </tr> <tr> <td>V_{CC} = 4.5V</td> <td>0 to 500</td> </tr> <tr> <td>V_{CC} = 6V</td> <td>0 to 400</td> </tr> <tr> <td>V_{CC} = 10V</td> <td>0 to 250</td> </tr> </table> | V _{CC} = 2V | 0 to 1000 | V _{CC} = 4.5V | 0 to 500 | V _{CC} = 6V | 0 to 400 | V _{CC} = 10V | 0 to 250 | ns |
| V _{CC} = 2V | 0 to 1000 | | | | | | | | | | |
| V _{CC} = 4.5V | 0 to 500 | | | | | | | | | | |
| V _{CC} = 6V | 0 to 400 | | | | | | | | | | |
| V _{CC} = 10V | 0 to 250 | | | | | | | | | | |

DC SPECIFICATIONS

| Symbol | Parameter | Test Conditions | | Value | | | | | Unit |
|------------------|---|------------------------|--|------------------------|------|------|--------------|------|------|
| | | | | T _A = 25 °C | | | -40 to 85 °C | | |
| | | V _{CC} (V) | | Min. | Typ. | Max. | Min. | Max. | |
| V _{IH} | High Level Input Voltage | 2.0 | | 1.5 | | | 1.5 | | V |
| | | 4.5 | | 3.15 | | | 3.15 | | |
| | | 9.0 | | 6.3 | | | 6.3 | | |
| | | 12.0 | | 8.4 | | | 8.4 | | |
| V _{IL} | Low Level Input Voltage | 2.0 | | | | 0.5 | | 0.5 | V |
| | | 4.5 | | | | 1.35 | | 1.35 | |
| | | 9.0 | | | | 2.7 | | 2.7 | |
| | | 12.0 | | | | 3.6 | | 3.6 | |
| R _{ON} | ON Resistance | 4.5 | V _I = V _{IH} V _{I/O} = V _{CC} to GND I _{I/O} ≤ 1mA | | 96 | 170 | | 200 | Ω |
| | | 9.0 | | | 55 | 85 | | 100 | |
| | | 12.0 | | | 45 | 80 | | 90 | |
| | | 4.5 | V _I = V _{IH} V _{I/O} = V _{CC} or GND I _{I/O} ≤ 1mA | | 70 | 100 | | 130 | |
| | | 9.0 | | | 50 | 75 | | 95 | |
| | | 12.0 | | | 45 | 70 | | 90 | |
| I _{OFF} | Input/Output Leakage Current (SWITCH OFF) | 12.0 | V _{OS} = V _{CC} to GND V _{IS} = V _{CC} to GND V _I = V _{IL} | | | ±0.1 | | ±1.0 | μA |
| I _{Iz} | Switch Input Leakage Current (SWITCH ON, OUTPUT OPEN) | 12.0 | V _{OS} = V _{CC} to GND V _I = V _{IH} | | | ±0.1 | | ±1.0 | μA |
| I _{IN} | Control Input Current | 6.0 | V _I = V _{CC} to GND | | | ±0.1 | | ±1.0 | μA |
| I _{CC} | Quiescent Supply Current | 6.0 | V _I = V _{CC} or GND | | | 1 | | 10 | μA |
| | | 9.0 | | | | 4 | | 40 | |
| | | 12.0 | | | | 8 | | 80 | |

AC ELECTRICAL CHARACTERISTICS ($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

| Symbol | Parameter | Test Condition | | Value | | | | | Unit |
|------------------------|---|-----------------|---|--------------------------|------|------|-----------------------------|------|------|
| | | V_{CC} (V) | | $T_A = 25^\circ\text{C}$ | | | -40 to 85°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | |
| $\Phi_{I/O}$ | Phase Difference Between Input and Output | 2.0 | | | 10 | 50 | | 65 | ns |
| | | 4.5 | | | 4 | 10 | | 15 | |
| | | 9.0 | | | 3 | 8 | | 13 | |
| | | 12.0 | | | 3 | 7 | | 10 | |
| t_{PZL} t_{PZH} | Output Enable Time | 2.0 | $R_L = 1\text{ K}\Omega$ | | 18 | 100 | | 125 | ns |
| | | 4.5 | | | 8 | 20 | | 25 | |
| | | 9.0 | | | 6 | 12 | | 22 | |
| | | 12.0 | | | 6 | 12 | | 18 | |
| t_{PLZ} t_{PHZ} | Output Disable Time | 2.0 | $R_L = 1\text{ K}\Omega$ | | 20 | 115 | | 145 | ns |
| | | 4.5 | | | 10 | 23 | | 29 | |
| | | 9.0 | | | 8 | 20 | | 25 | |
| | | 12.0 | | | 8 | 18 | | 22 | |
| | Maximum Control Input Frequency | 2.0 | $R_L = 1\text{ K}\Omega$ $C_L = 15\text{ pF}$ $V_{OUT} = 1/2V_{CC}$ | | 30 | | | | MHz |
| | | 4.5 | | | 30 | | | | |
| | | 9.0 | | | 30 | | | | |
| | | 12.0 | | | 30 | | | | |
| C_{IN} | Input Capacitance | | | | 5 | 10 | | 10 | pF |
| $C_{I/O}$ | Switch Terminal Capacitance | | | | 6 | | | | pF |
| C_{IOS} | Feed Through Capacitance | | | | 0.5 | | | | pF |
| C_{PD} | Power Dissipation Capacitance (note 1) | | | | 15 | | | | pF |

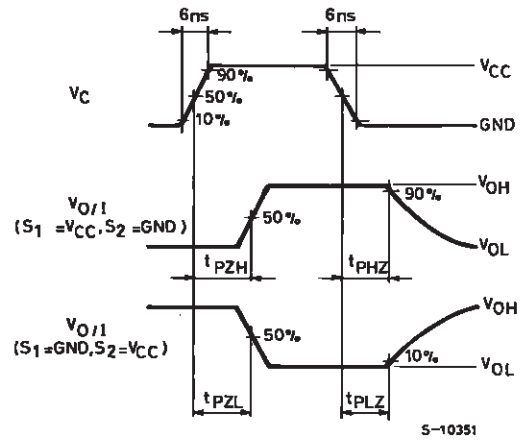
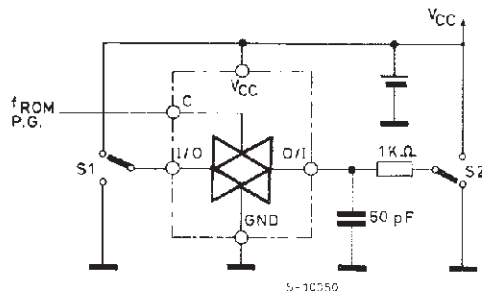
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

ANALOG SWITCH CHARACTERISTICS (GND = 0 V, $T_A = 25^\circ\text{C}$)

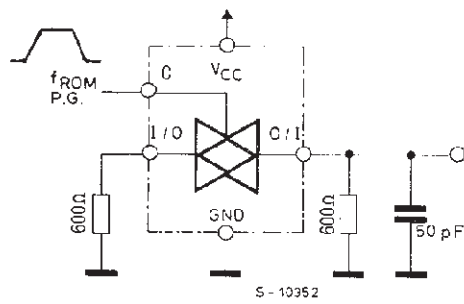
| Symbol | Parameter | Test Condition | | Value | Unit | |
|-----------|--|-----------------|--|--|------|-----|
| | | V_{CC} (V) | V_{IN} (Vp-p) | | | |
| | Sine Wave Distortion (THD) | 4.5 | 4 | $f_{IN} = 1\text{ KHz}$ $R_L = 10\text{ K}\Omega$ $C_L = 50\text{ pF}$ | 0.05 | % |
| | | 9.0 | 8 | | 0.04 | |
| f_{MAX} | Frequency Responce (Switch ON) | 4.5 | Adjust f_{IN} voltage to Obtain 0dBm at V_{OS} . | | 200 | MHz |
| | | 9.0 | Increase f_{IN} Frequency until dB Meter reads -3dB $R_L = 50\Omega$, $C_L = 10\text{ pF}$ | | 200 | |
| | Feedthrough Attenuation (Switch OFF) | 4.5 | V_{IN} is centered at $V_{CC}/2$. Adjust input for 0dBm $R_L = 600\Omega$, $C_L = 50\text{ pF}$, $f_{IN} = 1\text{ MHz}$ sine wave | | -60 | dB |
| | | 9.0 | | | -60 | |
| | Crosstalk (Control Input to Signal Ouput) | 4.5 | $R_L = 600\Omega$, $C_L = 50\text{ pF}$, $f_{IN} = 1\text{ MHz}$ sine wave ($t_r = t_f = 6\text{ ns}$) | | 60 | mV |
| | | 9.0 | | | 100 | |

SWITCHING CHARACTERISTICS TEST CIRCUIT

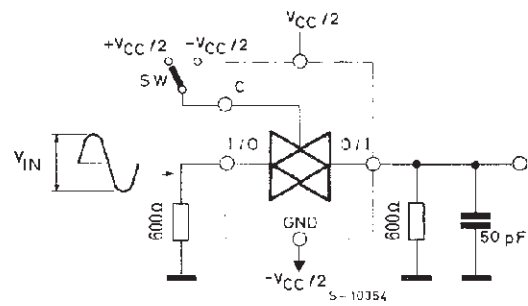
t_{PLZ} , t_{PHZ} , t_{PZL} , t_{PZH} .



CROSSTALK (control to output)

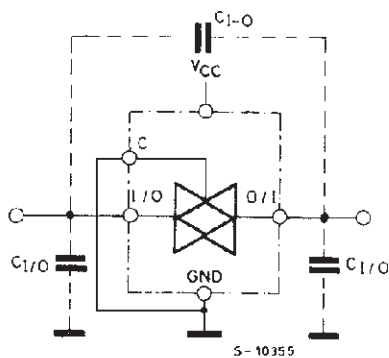


BANDWIDTH AND FEEDTHROUGH ATTENUATION



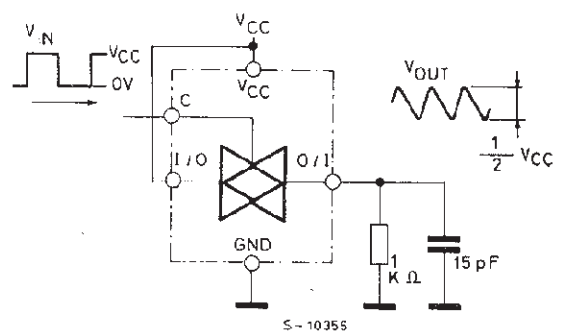
GND (V_{SS})

C_{I-O} $C_{I/O}$

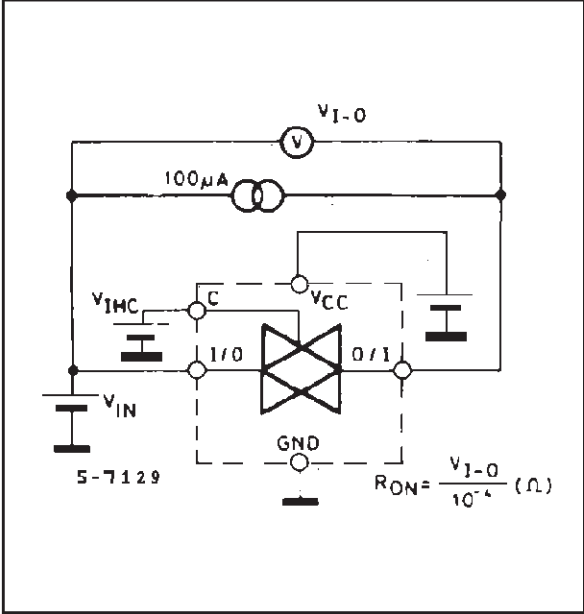


GND (V_{SS})

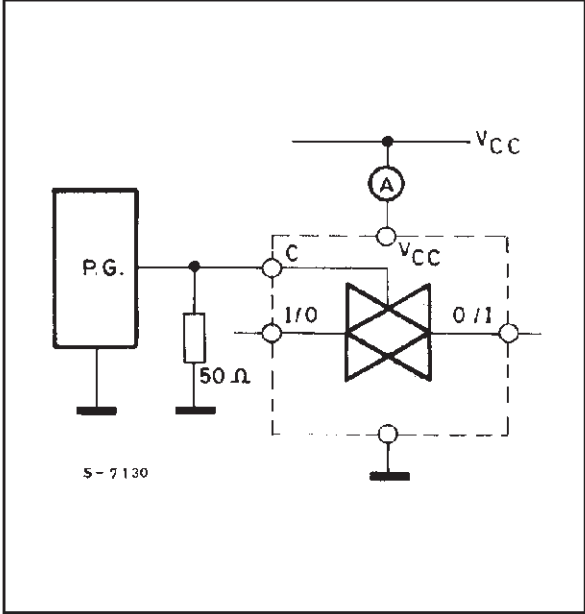
MAXIMUM CONTROL FREQUENCY



CHANNEL RESITANCE (RON)

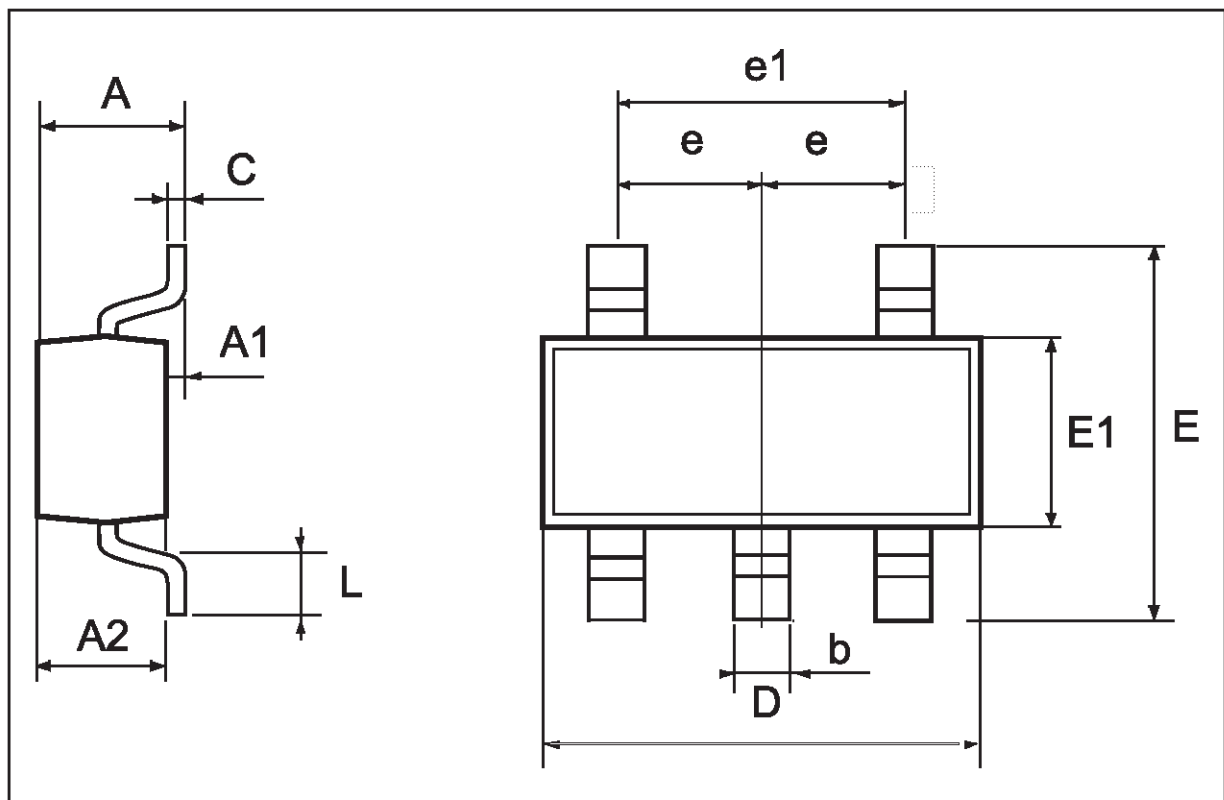


Icc (Opr.)



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 | |



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