

## QUAD BILATERAL SWITCHES

### FEATURES

- Very low "ON" resistance:  
50  $\Omega$  (typ.) at  $V_{CC} = 4.5$  V  
45  $\Omega$  (typ.) at  $V_{CC} = 6.0$  V  
35  $\Omega$  (typ.) at  $V_{CC} = 9.0$  V
- Output capability: non-standard
- I<sub>CC</sub> category: SSI

### GENERAL DESCRIPTION

The 74HC/HCT4066 are high-speed Si-gate CMOS devices and are pin compatible with the "4066" of the "4000B" series. They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT4066 have four independent analog switches. Each switch has two input/output terminals (nY, nZ) and an active HIGH enable input (nE). When nE is LOW the belonging analog switch is turned off. The "4066" is pin compatible with the "4016" but exhibits a much lower "ON" resistance. In addition, the "ON" resistance is relatively constant over the full input signal range.

| SYMBOL                                 | PARAMETER                                   | CONDITIONS                                                                       | TYPICAL |     | UNIT |
|----------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------|---------|-----|------|
|                                        |                                             |                                                                                  | HC      | HCT |      |
| t <sub>PZH</sub> /<br>t <sub>PZL</sub> | turn-on time<br>nE to V <sub>OS</sub>       | C <sub>L</sub> = 15 pF<br>R <sub>L</sub> = 1 k $\Omega$<br>V <sub>CC</sub> = 5 V | 11      | 12  | ns   |
| t <sub>PHZ</sub> /<br>t <sub>PLZ</sub> | turn-off time<br>nE to V <sub>OS</sub>      |                                                                                  | 13      | 16  | ns   |
| C <sub>I</sub>                         | input capacitance                           |                                                                                  | 3.5     | 3.5 | pF   |
| C <sub>PD</sub>                        | power dissipation<br>capacitance per switch | notes 1 and 2                                                                    | 11      | 12  | pF   |
| C <sub>S</sub>                         | max. switch capacitance                     |                                                                                  | 8       | 8   | pF   |

GND = 0 V; T<sub>amb</sub> = 25 °C; t<sub>r</sub> = t<sub>f</sub> = 6 ns

### Notes

1. C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in  $\mu$ W):  

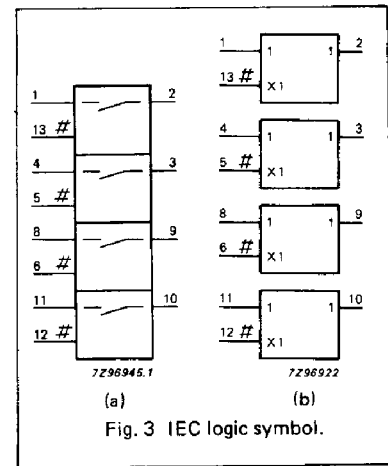
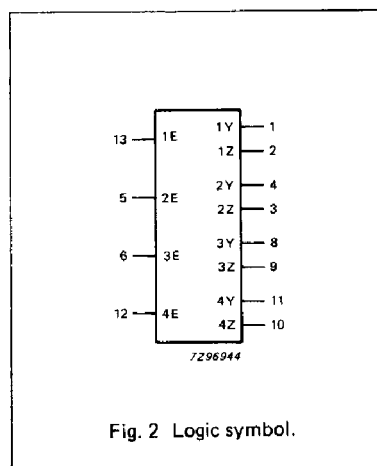
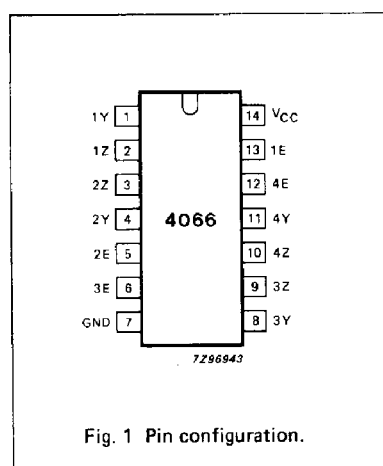
$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum \{ (C_L + C_S) \times V_{CC}^2 \times f_o \}$$
where:  
f<sub>i</sub> = input frequency in MHz  
f<sub>o</sub> = output frequency in MHz  
 $\sum \{ (C_L + C_S) \times V_{CC}^2 \times f_o \}$  = sum of outputs  
C<sub>L</sub> = output load capacitance in pF  
C<sub>S</sub> = max. switch capacitance in pF  
V<sub>CC</sub> = supply voltage in V
2. For HC the condition is V<sub>I</sub> = GND to V<sub>CC</sub>  
For HCT the condition is V<sub>I</sub> = GND to V<sub>CC</sub> - 1.5 V

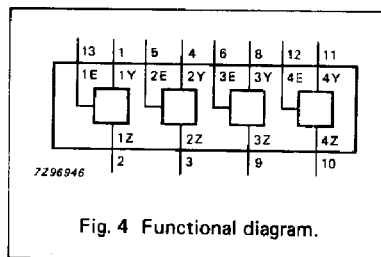
### PACKAGE OUTLINES

14-lead DIL; plastic (SOT27).  
14-lead mini-pack; plastic (SO14; SOT108A).

### PIN DESCRIPTION

| PIN NO.      | SYMBOL          | NAME AND FUNCTION           |
|--------------|-----------------|-----------------------------|
| 1, 4, 8, 11  | 1Y to 4Y        | independent inputs/outputs  |
| 2, 3, 9, 10  | 1Z to 4Z        | independent inputs/outputs  |
| 7            | GND             | ground (0 V)                |
| 13, 5, 6, 12 | 1E to 4E        | enable inputs (active HIGH) |
| 14           | V <sub>CC</sub> | positive supply voltage     |

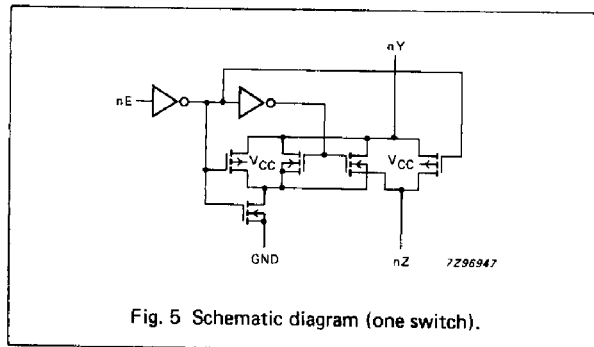




FUNCTION TABLE

| INPUT<br>nE | SWITCH |
|-------------|--------|
| L           | off    |
| H           | on     |

H = HIGH voltage level  
L = LOW voltage level



**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages are referenced to GND (ground = 0 V)

| SYMBOL                          | PARAMETER                      | MIN. | MAX.  | UNIT | CONDITIONS                                        |
|---------------------------------|--------------------------------|------|-------|------|---------------------------------------------------|
| $V_{CC}$                        | DC supply voltage              | -0.5 | +11.0 | V    |                                                   |
| $\pm I_{IK}$                    | DC digital input diode current |      | 20    | mA   | for $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V      |
| $\pm I_{SK}$                    | DC switch diode current        |      | 20    | mA   | for $V_S < -0.5$ V or $V_S > V_{CC} + 0.5$ V      |
| $\pm I_S$                       | DC switch current              |      | 25    | mA   | for $-0.5$ V $< V_S < V_{CC} + 0.5$ V             |
| $\pm I_{CC}$ ;<br>$\pm I_{GND}$ | DC $V_{CC}$ or GND current     |      | 50    | mA   |                                                   |
| $T_{stg}$                       | storage temperature range      | -65  | +150  | °C   |                                                   |
| $P_{tot}$                       | power dissipation per package  |      |       |      | for temperature range: -40 to +125 °C<br>74HC/HCT |
|                                 | plastic DIL                    |      | 750   | mW   | above +70 °C: derate linearly with 12 mW/K        |
|                                 | plastic mini-pack (SO)         |      | 500   | mW   | above +70 °C: derate linearly with 8 mW/K         |
| $P_S$                           | power dissipation per switch   |      | 100   | mW   |                                                   |

**Note to the Ratings**

To avoid drawing  $V_{CC}$  current out of terminal nZ, when switch current flows in terminal nY, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no  $V_{CC}$  current will flow out of terminal nY. In this case there is no limit for the voltage drop across the switch, but the voltages at nY and nZ may not exceed  $V_{CC}$  or GND.

**RECOMMENDED OPERATING CONDITIONS**

| SYMBOL     | PARAMETER                           | 74HC |      |                           | 74HCT |      |          | UNIT | CONDITIONS                                                                    |
|------------|-------------------------------------|------|------|---------------------------|-------|------|----------|------|-------------------------------------------------------------------------------|
|            |                                     | min. | typ. | max.                      | min.  | typ. | max.     |      |                                                                               |
| $V_{CC}$   | DC supply voltage                   | 2.0  | 5.0  | 10.0                      | 4.5   | 5.0  | 5.5      | V    |                                                                               |
| $V_I$      | DC input voltage range              | GND  |      | $V_{CC}$                  | GND   |      | $V_{CC}$ | V    |                                                                               |
| $V_S$      | DC switch voltage range             | GND  |      | $V_{CC}$                  | GND   |      | $V_{CC}$ | V    |                                                                               |
| $T_{amb}$  | operating ambient temperature range | -40  |      | +85                       | -40   |      | +85      | °C   | see DC and AC CHARACTERISTICS                                                 |
| $T_{amb}$  | operating ambient temperature range | -40  |      | +125                      | -40   |      | +125     | °C   |                                                                               |
| $t_r, t_f$ | input rise and fall times           |      | 6.0  | 1000<br>500<br>400<br>250 |       | 6.0  | 500      | ns   | $V_{CC} = 2.0$ V<br>$V_{CC} = 4.5$ V<br>$V_{CC} = 6.0$ V<br>$V_{CC} = 10.0$ V |

# DC CHARACTERISTICS FOR 74HC/HCT

For 74HC:  $V_{CC} = 2.0, 4.5, 6.0$  and  $9.0$  V

For 74HCT:  $V_{CC} = 4.5$  V

| SYMBOL           | PARAMETER                                                         | T <sub>amb</sub> (°C) |      |      |            |      |             |      |   | UNIT | TEST CONDITIONS      |                              |                                          |                |
|------------------|-------------------------------------------------------------------|-----------------------|------|------|------------|------|-------------|------|---|------|----------------------|------------------------------|------------------------------------------|----------------|
|                  |                                                                   | 74HC/HCT              |      |      |            |      |             |      |   |      | V <sub>CC</sub><br>V | I <sub>S</sub><br>μA         | V <sub>is</sub>                          | V <sub>I</sub> |
|                  |                                                                   | +25                   |      |      | −40 to +85 |      | −40 to +125 |      |   |      |                      |                              |                                          |                |
|                  |                                                                   | min.                  | typ. | max. | min.       | max. | min.        | max. |   |      |                      |                              |                                          |                |
| R <sub>ON</sub>  | ON-resistance (peak)                                              |                       | —    | —    |            | —    |             | —    | Ω | 2.0  | 100                  | V <sub>CC</sub><br>to<br>GND | V <sub>IH</sub><br>or<br>V <sub>IL</sub> |                |
|                  |                                                                   |                       | 54   | 95   |            | 118  |             | 142  | Ω | 4.5  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 42   | 84   |            | 105  |             | 126  | Ω | 6.0  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 32   | 70   |            | 88   |             | 105  | Ω | 9.0  | 1000                 |                              |                                          |                |
| R <sub>ON</sub>  | ON-resistance (rail)                                              |                       | 80   | —    |            | —    |             | —    | Ω | 2.0  | 100                  | GND                          | V <sub>IH</sub><br>or<br>V <sub>IL</sub> |                |
|                  |                                                                   |                       | 35   | 75   |            | 95   |             | 115  | Ω | 4.5  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 27   | 65   |            | 82   |             | 100  | Ω | 6.0  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 20   | 55   |            | 70   |             | 85   | Ω | 9.0  | 1000                 |                              |                                          |                |
| R <sub>ON</sub>  | ON-resistance (rail)                                              |                       | 100  | —    |            | —    |             | —    | Ω | 2.0  | 100                  | V <sub>CC</sub>              | V <sub>IH</sub><br>or<br>V <sub>IL</sub> |                |
|                  |                                                                   |                       | 42   | 80   |            | 106  |             | 128  | Ω | 4.5  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 35   | 75   |            | 94   |             | 113  | Ω | 6.0  | 1000                 |                              |                                          |                |
|                  |                                                                   |                       | 27   | 60   |            | 78   |             | 95   | Ω | 9.0  | 1000                 |                              |                                          |                |
| ΔR <sub>ON</sub> | maximum variation of<br>ON-resistance between<br>any two channels |                       | —    |      |            |      |             |      | Ω | 2.0  |                      | V <sub>CC</sub><br>to<br>GND | V <sub>IH</sub><br>or<br>V <sub>IL</sub> |                |
|                  |                                                                   |                       | 5    |      |            |      |             |      | Ω | 4.5  |                      |                              |                                          |                |
|                  |                                                                   |                       | 4    |      |            |      |             |      | Ω | 6.0  |                      |                              |                                          |                |
|                  |                                                                   |                       | 3    |      |            |      |             |      | Ω | 9.0  |                      |                              |                                          |                |

## Note to DC characteristics

- At supply voltages approaching 2 V, the analog switch ON-resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.

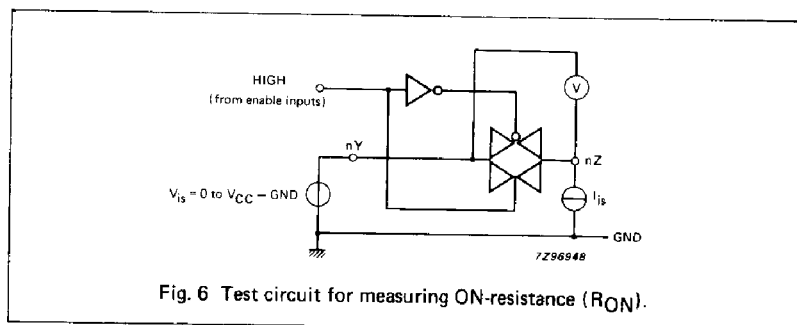


Fig. 6 Test circuit for measuring ON-resistance ( $R_{ON}$ ).

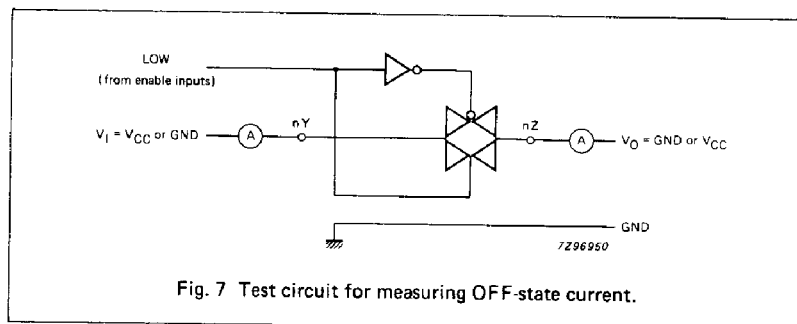


Fig. 7 Test circuit for measuring OFF-state current.

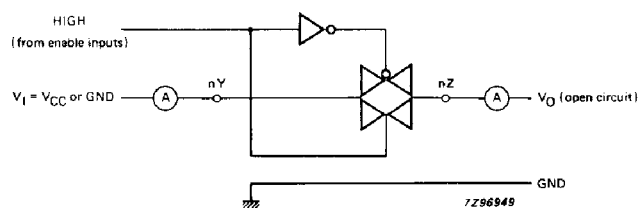
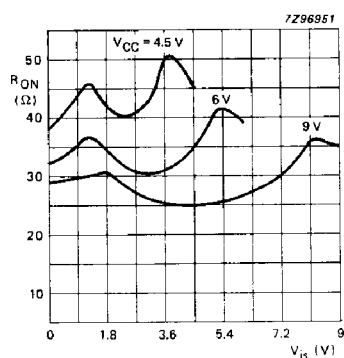


Fig. 8 Test circuit for measuring ON-state current.

Fig. 9 Typical ON-resistance ( $R_{ON}$ ) as a function of input voltage ( $V_{IS}$ ) for  $V_{IS} = 0$  to  $V_{CC}$ .

# DC CHARACTERISTICS FOR 74HC

Voltage are referenced to GND (ground = 0 V)

| SYMBOL          | PARAMETER                                   | T <sub>amb</sub> (°C)     |                          |                              |                           |                              |                           |                              |    | UNIT                     | TEST CONDITIONS                          |                                                                                        |       |
|-----------------|---------------------------------------------|---------------------------|--------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|----|--------------------------|------------------------------------------|----------------------------------------------------------------------------------------|-------|
|                 |                                             | 74HC                      |                          |                              |                           |                              |                           |                              |    |                          | V <sub>CC</sub><br>V                     | V <sub>I</sub>                                                                         | OTHER |
|                 |                                             | +25                       |                          |                              | -40 to +85                |                              | -40 to +125               |                              |    |                          |                                          |                                                                                        |       |
|                 |                                             | min.                      | typ.                     | max.                         | min.                      | max.                         | min.                      | max.                         |    |                          |                                          |                                                                                        |       |
| V <sub>IH</sub> | HIGH level input voltage                    | 1.5<br>3.15<br>4.2<br>6.3 | 1.2<br>2.4<br>3.2<br>4.7 |                              | 1.5<br>3.15<br>4.2<br>6.3 |                              | 1.5<br>3.15<br>4.2<br>6.3 |                              | V  | 2.0<br>4.5<br>6.0<br>9.0 |                                          |                                                                                        |       |
| V <sub>IL</sub> | LOW level input voltage                     |                           | 0.8<br>2.1<br>2.8<br>4.3 | 0.50<br>1.35<br>1.80<br>2.70 |                           | 0.50<br>1.35<br>1.80<br>2.70 |                           | 0.50<br>1.35<br>1.80<br>2.70 | V  | 2.0<br>4.5<br>6.0<br>9.0 |                                          |                                                                                        |       |
| ±I <sub>I</sub> | input leakage current                       |                           |                          | 0.1<br>0.2                   |                           | 1.0<br>2.0                   |                           | 1.0<br>2.0                   | μA | 6.0<br>10.0              | V <sub>CC</sub><br>or<br>GND             |                                                                                        |       |
| ±I <sub>S</sub> | analog switch OFF-state current per channel |                           |                          | 0.1                          |                           | 1.0                          |                           | 1.0                          | μA | 10.0                     | V <sub>IH</sub><br>or<br>V <sub>IL</sub> | V <sub>S</sub>   = V <sub>CC</sub> - GND<br>(see Fig. 7)                               |       |
| ±I <sub>S</sub> | analog switch ON-state current              |                           |                          | 0.1                          |                           | 1.0                          |                           | 1.0                          | μA | 10.0                     | V <sub>IH</sub><br>or<br>V <sub>IL</sub> | V <sub>S</sub>   = V <sub>CC</sub> - GND<br>(see Fig. 8)                               |       |
| I <sub>CC</sub> | quiescent supply current                    |                           |                          | 2.0<br>4.0                   |                           | 20.0<br>40.0                 |                           | 40.0<br>80.0                 | μA | 6.0<br>10.0              | V <sub>CC</sub><br>or<br>GND             | V <sub>is</sub> = GND or V <sub>CC</sub> ;<br>V <sub>os</sub> = V <sub>CC</sub> or GND |       |

# AC CHARACTERISTICS FOR 74HC

GND = 0 V; t<sub>r</sub> = t<sub>f</sub> = 6 ns; C<sub>L</sub> = 50 pF

| SYMBOL                                 | PARAMETER                                               | T <sub>amb</sub> (°C) |                      |                       |            |                       |             |                       | UNIT | TEST CONDITIONS          |                                                                          |
|----------------------------------------|---------------------------------------------------------|-----------------------|----------------------|-----------------------|------------|-----------------------|-------------|-----------------------|------|--------------------------|--------------------------------------------------------------------------|
|                                        |                                                         | 74HC                  |                      |                       |            |                       |             |                       |      | V <sub>CC</sub><br>V     | OTHER                                                                    |
|                                        |                                                         | +25                   |                      |                       | -40 to +85 |                       | -40 to +125 |                       |      |                          |                                                                          |
|                                        |                                                         | min.                  | typ.                 | max.                  | min.       | max.                  | min.        | max.                  |      |                          |                                                                          |
| t <sub>PHL</sub> /<br>t <sub>PLH</sub> | propagation delay<br>V <sub>is</sub> to V <sub>os</sub> |                       | 8<br>3<br>2<br>2     | 60<br>12<br>10<br>8   |            | 75<br>15<br>13<br>10  |             | 90<br>18<br>15<br>12  | ns   | 2.0<br>4.5<br>6.0<br>9.0 | R <sub>L</sub> = ∞;<br>C <sub>L</sub> = 50 pF<br>(see Fig. 17)           |
| t <sub>pZH</sub> /<br>t <sub>pZL</sub> | turn-on time<br>nE to V <sub>os</sub>                   |                       | 36<br>13<br>10<br>8  | 100<br>20<br>17<br>13 |            | 125<br>25<br>21<br>16 |             | 150<br>30<br>26<br>20 | ns   | 2.0<br>4.5<br>6.0<br>9.0 | R <sub>L</sub> = 1 kΩ;<br>C <sub>L</sub> = 50 pF<br>(see Figs 18 and 19) |
| t <sub>pHZ</sub> /<br>t <sub>pLZ</sub> | turn-off time<br>nE to V <sub>os</sub>                  |                       | 44<br>16<br>13<br>16 | 150<br>30<br>26<br>24 |            | 190<br>38<br>33<br>16 |             | 225<br>45<br>38<br>20 | ns   | 2.0<br>4.5<br>6.0<br>9.0 | R <sub>L</sub> = 1 kΩ;<br>C <sub>L</sub> = 50 pF<br>(see Figs 18 and 19) |

## DC CHARACTERISTICS FOR 74HCT

Voltages are referenced to GND (ground = 0 V)

| SYMBOL           | PARAMETER                                                                                 | T <sub>amb</sub> (°C) |      |      |            |      |             |      | UNIT | TEST CONDITIONS      |                                    |                                                                                     |
|------------------|-------------------------------------------------------------------------------------------|-----------------------|------|------|------------|------|-------------|------|------|----------------------|------------------------------------|-------------------------------------------------------------------------------------|
|                  |                                                                                           | 74HCT                 |      |      |            |      |             |      |      | V <sub>CC</sub><br>V | V <sub>I</sub>                     | OTHER                                                                               |
|                  |                                                                                           | +25                   |      |      | -40 to +85 |      | -40 to +125 |      |      |                      |                                    |                                                                                     |
|                  |                                                                                           | min.                  | typ. | max. | min.       | max. | min.        | max. |      |                      |                                    |                                                                                     |
| V <sub>IH</sub>  | HIGH level input voltage                                                                  | 2.0                   | 1.6  |      | 2.0        |      | 2.0         |      | V    | 4.5 to 5.5           |                                    |                                                                                     |
| V <sub>IL</sub>  | LOW level input voltage                                                                   |                       | 1.2  | 0.8  |            | 0.8  |             | 0.8  | V    | 4.5 to 5.5           |                                    |                                                                                     |
| ±I <sub>I</sub>  | input leakage current                                                                     |                       |      | 0.1  |            | 1.0  |             | 1.0  | μA   | 5.5                  | V <sub>CC</sub> or GND             |                                                                                     |
| ±I <sub>S</sub>  | analog switch OFF-state current per channel                                               |                       |      | 0.1  |            | 1.0  |             | 1.0  | μA   | 5.5                  | V <sub>IH</sub> or V <sub>IL</sub> | V <sub>S</sub>   = V <sub>CC</sub> - GND (see Fig. 7)                               |
| ±I <sub>S</sub>  | analog switch ON-state current                                                            |                       |      | 0.1  |            | 1.0  |             | 1.0  | μA   | 5.5                  | V <sub>IH</sub> or V <sub>IL</sub> | V <sub>S</sub>   = V <sub>CC</sub> - GND (see Fig. 8)                               |
| I <sub>CC</sub>  | quiescent supply current                                                                  |                       |      | 2.0  |            | 20.0 |             | 40.0 | μA   | 4.5 to 5.5           | V <sub>CC</sub> or GND             | V <sub>is</sub> = GND or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or GND |
| ΔI <sub>CC</sub> | additional quiescent supply current per input pin for unit load coefficient is 1 (note 1) |                       | 100  | 360  |            | 450  |             | 490  | μA   | 4.5 to 5.5           | V <sub>CC</sub> -2.1 V             | other inputs at V <sub>CC</sub> or GND                                              |

## Note

1. The value of additional quiescent supply current (ΔI<sub>CC</sub>) for a unit load of 1 is given here.  
To determine ΔI<sub>CC</sub> per input, multiply this value by the unit load coefficient shown in the table below.

| INPUT | UNIT LOAD COEFFICIENT |
|-------|-----------------------|
| nE    | 1.00                  |

# AC CHARACTERISTICS FOR 74HCT

GND = 0 V;  $t_r = t_f = 6$  ns

| SYMBOL                                 | PARAMETER                                               | T <sub>amb</sub> (°C) |      |      |            |      |             |      | UNIT | TEST CONDITIONS      |                                                                       |
|----------------------------------------|---------------------------------------------------------|-----------------------|------|------|------------|------|-------------|------|------|----------------------|-----------------------------------------------------------------------|
|                                        |                                                         | 74HCT                 |      |      |            |      |             |      |      | V <sub>CC</sub><br>V | OTHER                                                                 |
|                                        |                                                         | +25                   |      |      | −40 to +85 |      | −40 to +125 |      |      |                      |                                                                       |
|                                        |                                                         | min.                  | typ. | max. | min.       | max. | min.        | max. |      |                      |                                                                       |
| t <sub>PHL</sub> /<br>t <sub>PLH</sub> | propagation delay<br>V <sub>is</sub> to V <sub>os</sub> |                       | 3    | 12   |            | 15   |             | 18   | ns   | 4.5                  | R <sub>L</sub> = ∞; C <sub>L</sub> = 50 pF<br>(see Fig. 17)           |
| t <sub>PZH</sub> /<br>t <sub>PZL</sub> | turn-on time<br>nE to V <sub>os</sub>                   |                       | 12   | 24   |            | 30   |             | 36   | ns   | 4.5                  | R <sub>L</sub> = 1 kΩ; C <sub>L</sub> = 50 pF<br>(see Figs 18 and 19) |
| t <sub>PHZ</sub> /<br>t <sub>PLZ</sub> | turn-off time<br>nE to V <sub>os</sub>                  |                       | 20   | 35   |            | 44   |             | 53   | ns   | 4.5                  | R <sub>L</sub> = 1 kΩ; C <sub>L</sub> = 50 pF<br>(see Figs 18 and 19) |

# ADDITIONAL AC CHARACTERISTICS FOR 74HC/HCT

Recommended conditions and typical values

GND = 0 V;  $t_r = t_f = 6$  ns

| SYMBOL             | PARAMETER                                                                                  | TYP.         | UNIT       | V <sub>CC</sub><br>V | V <sub>is(p-p)</sub><br>V | CONDITIONS                                                                                                                                                                 |
|--------------------|--------------------------------------------------------------------------------------------|--------------|------------|----------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | sine-wave distortion<br>f = 1 kHz                                                          | 0.04<br>0.02 | %<br>%     | 4.5<br>9.0           | 4.0<br>8.0                | R <sub>L</sub> = 10 kΩ; C <sub>L</sub> = 50 pF<br>(see Fig. 15)                                                                                                            |
|                    | sine-wave distortion<br>f = 10 kHz                                                         | 0.12<br>0.06 | %<br>%     | 4.5<br>9.0           | 4.0<br>8.0                | R <sub>L</sub> = 10 kΩ; C <sub>L</sub> = 50 pF<br>(see Fig. 15)                                                                                                            |
|                    | switch "OFF" signal<br>feed-through                                                        | -50<br>-50   | dB<br>dB   | 4.5<br>9.0           | note 1                    | R <sub>L</sub> = 600 Ω; C <sub>L</sub> = 50 pF;<br>f = 1 MHz (see Figs 10 and 16)                                                                                          |
|                    | crosstalk between<br>any two switches                                                      | -60<br>-60   | dB<br>dB   | 4.5<br>9.0           | note 1                    | R <sub>L</sub> = 600 Ω; C <sub>L</sub> = 50 pF;<br>f = 1 MHz (see Fig. 12)                                                                                                 |
| V <sub>(p-p)</sub> | crosstalk voltage between enable<br>or address input to any switch<br>(peak-to-peak value) | 110<br>220   | mV<br>mV   | 4.5<br>9.0           |                           | R <sub>L</sub> = 600 Ω; C <sub>L</sub> = 50 pF;<br>f = 1 MHz (nE, square wave<br>between V <sub>CC</sub> and GND,<br>t <sub>r</sub> = t <sub>f</sub> = 6 ns) (see Fig. 13) |
| f <sub>max</sub>   | minimum frequency response<br>(-3 dB)                                                      | 180<br>200   | MHz<br>MHz | 4.5<br>9.0           | note 2                    | R <sub>L</sub> = 50 Ω; C <sub>L</sub> = 10 pF<br>(see Figs 11 and 14)                                                                                                      |
| C <sub>S</sub>     | maximum switch capacitance                                                                 | 8            | pF         |                      |                           |                                                                                                                                                                            |

## Notes to the AC characteristics

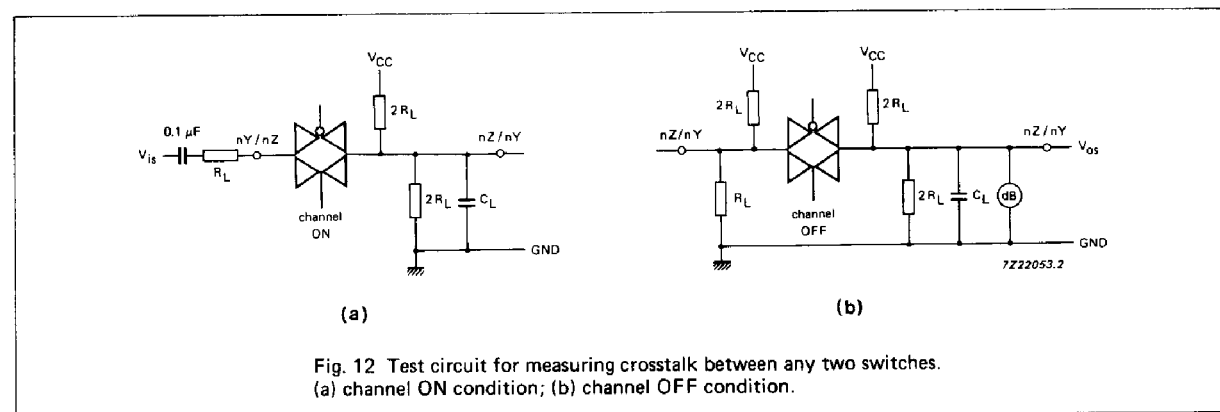
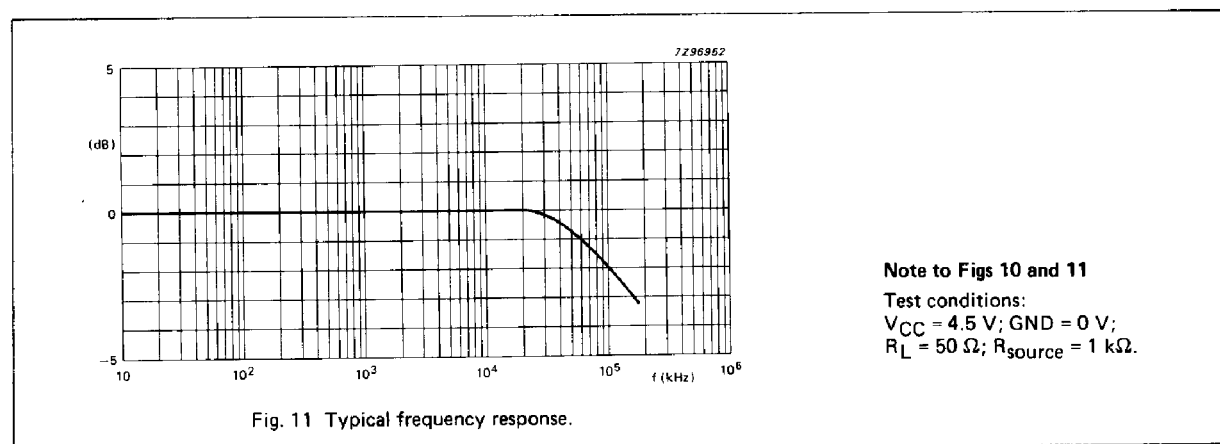
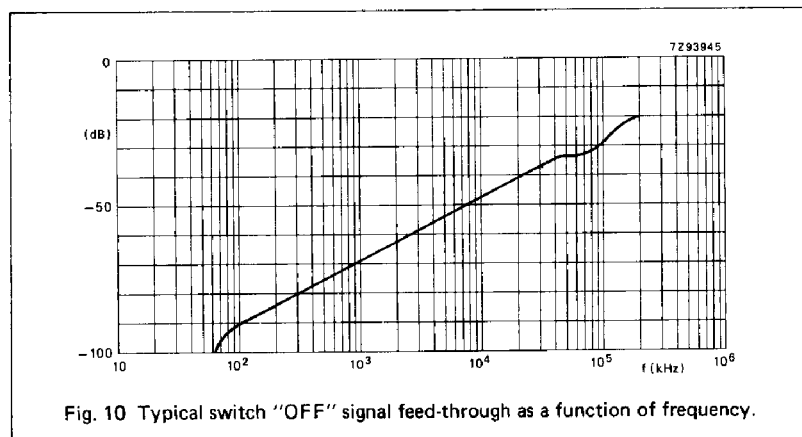
### General note

V<sub>is</sub> is the input voltage at nY or nZ terminal, whichever is assigned as an input.

V<sub>Os</sub> is the output voltage at nY or nZ terminal, whichever is assigned as an output.

### Notes

1. Adjust input voltage V<sub>is</sub> is 0 dBm level (0 dBm = 1 mW into 600 Ω).
2. Adjust input voltage V<sub>is</sub> is 0 dBm level at V<sub>Os</sub> for 1 MHz (0 dBm = 1 mW into 50 Ω).



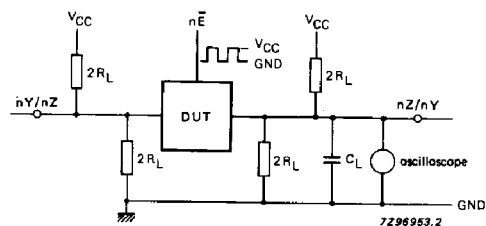


Fig. 13 Test circuit for measuring crosstalk between control and any switch.

**Note to Fig. 13**

The crosstalk is defined as follows (oscilloscope output):

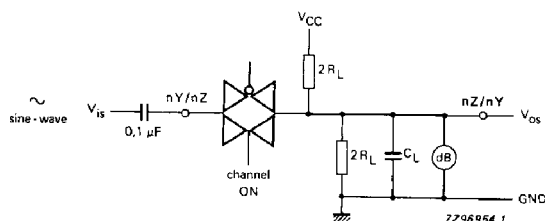
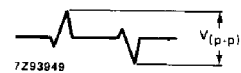


Fig. 14 Test circuit for measuring minimum frequency response.

**Note to Fig. 14**

Adjust input voltage to obtain 0 dBm at  $V_{OS}$  when  $f_{in} = 1$  MHz. After set-up frequency of  $f_{in}$  is increased to obtain a reading of -3 dB at  $V_{OS}$ .

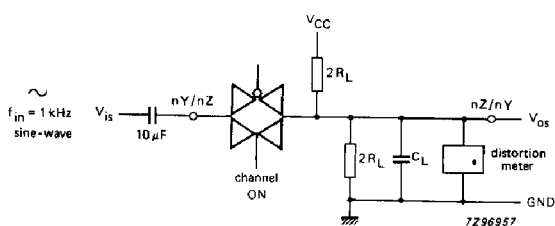


Fig. 15 Test circuit for measuring sine-wave distortion.

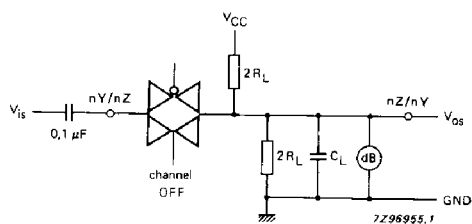
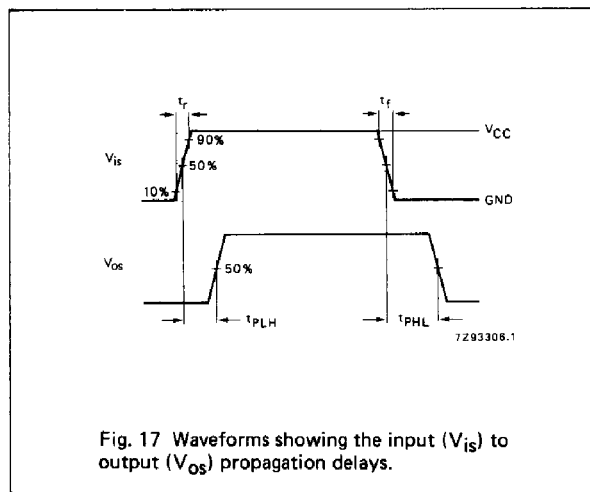


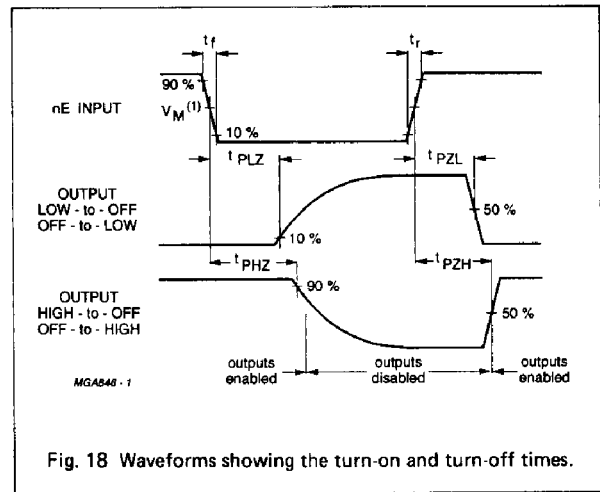
Fig. 16 Test circuit for measuring switch "OFF" signal feed-through.

## AC WAVEFORMS



## Note to AC waveforms

- (1) HC :  $V_M = 50\%$ ;  $V_I = \text{GND to } V_{CC}$ .  
HCT:  $V_M = 1.3 \text{ V}$ ;  $V_I = \text{GND to } 3 \text{ V}$ .



TEST CIRCUIT AND WAVEFORMS

