

DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

74HC/HCT4353

Triple 2-channel analog
multiplexer/demultiplexer with latch

Product specification
File under Integrated Circuits, IC06

December 1990

Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

FEATURES

- Wide analog input voltage range: ± 5 V
- Low "ON" resistance:
 - 80 Ω (typ.) at $V_{CC} - V_{EE} = 4.5$ V
 - 70 Ω (typ.) at $V_{CC} - V_{EE} = 6.0$ V
 - 60 Ω (typ.) at $V_{CC} - V_{EE} = 9.0$ V
- Logic level translation:
 - to enable 5 V logic to communicate with ± 5 V analog signals
- Typical "break before make" built in
- Address latches provided
- Output capability: non-standard
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT4353 are high-speed Si-gate CMOS devices. They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT4353 are triple 2-channel analog multiplexers/demultiplexers with two common enable inputs (\bar{E}_1 and E_2) and a latch enable input (\bar{LE}). Each

multiplexer has two independent inputs/outputs (nY_0 and nY_1), a common input/output (nZ) and select inputs (S_1 to S_3).

Each multiplexer/demultiplexer contains two bidirectional analog switches, each with one side connected to an independent input/output (nY_0 and nY_1) and the other side connected to a common input/output (nZ).

With \bar{E}_1 LOW and E_2 HIGH, one of the two switches is selected (low impedance ON-state) by S_1 to S_3 .

The data at the select inputs may be latched by using the active LOW latch enable input (\bar{LE}). When \bar{LE} is HIGH, the latch is transparent. When either of the two enable inputs, \bar{E}_1 (active LOW) and E_2 (active HIGH), is inactive, all analog switches are turned off.

V_{CC} and GND are the supply voltage pins for the digital control inputs (S_1 to S_3 , \bar{LE} , \bar{E}_1 and E_2). The V_{CC} to GND ranges are 2.0 to 10.0 V for HC and 4.5 to 5.5 V for HCT. The analog inputs/outputs (nY_0 and nY_1 , and nZ) can swing between V_{CC} as a positive limit and V_{EE} as a negative limit. $V_{CC} - V_{EE}$ may not exceed 10.0 V.

For operation as a digital multiplexer/demultiplexer, V_{EE} is connected to GND (typically ground).

QUICK REFERENCE DATA

$V_{EE} = \text{GND} = 0$ V; $T_{\text{amb}} = 25$ °C; $t_r = t_f = 6$ ns

| SYMBOL | PARAMETER | CONDITIONS | TYPICAL | | UNIT |
|-------------------|--|---------------------------------------|---------|-----|------|
| | | | HC | HCT | |
| t_{PZH}/t_{PZL} | turn "ON" time \bar{E}_1 , E_2 or S_n to V_{os} | $C_L = 50$ pF; $R_L = 1$ k Ω ; | 29 | 21 | ns |
| t_{PHZ}/t_{PLZ} | turn "OFF" time \bar{E}_1 , E_2 or S_n to V_{os} | $V_{CC} = 5$ V | 20 | 22 | ns |
| C_I | input capacitance | | 3.5 | 3.5 | pF |
| C_{PD} | power dissipation capacitance per switch | notes 1 and 2 | 23 | 23 | pF |
| C_S | max. switch capacitance independent (Y) common (Z) | | 5 | 5 | pF |
| | | | 8 | 8 | pF |

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μ W):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum \{(C_L + C_S) \times V_{CC}^2 \times f_o\} \text{ where:}$$

f_i = input frequency in MHz

C_L = output load capacitance in pF

f_o = output frequency in MHz

C_S = max. switch capacitance in pF

$$\sum \{(C_L \times C_S) \times V_{CC}^2 \times f_o\} = \text{sum of outputs}$$

V_{CC} = supply voltage in V

2. For HC the condition is $V_I = \text{GND}$ to V_{CC}
For HCT the condition is $V_I = \text{GND}$ to $V_{CC} - 1.5$ V

ORDERING INFORMATION

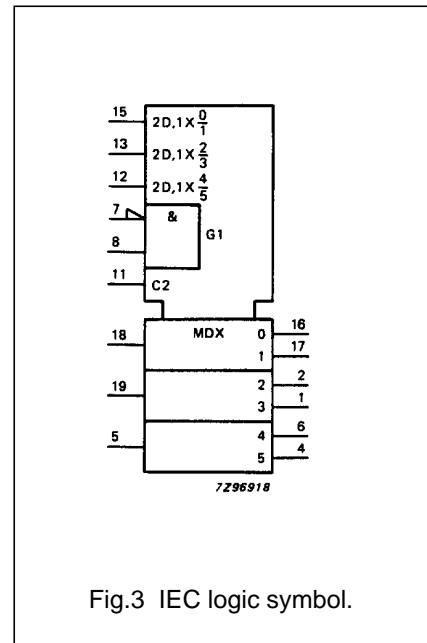
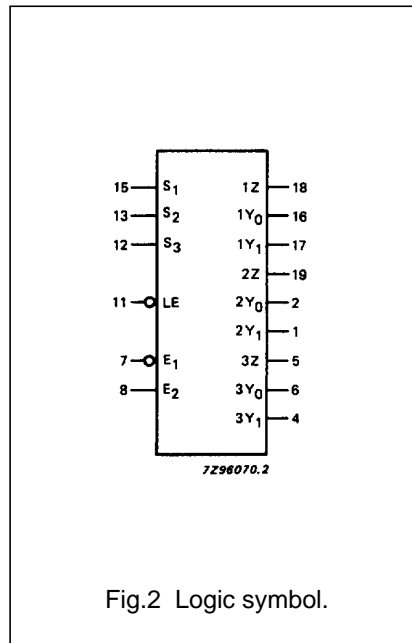
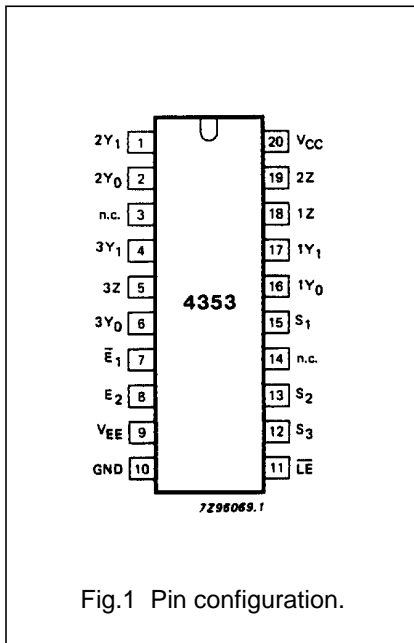
See "74HC/HCT/HCU/HCMOS Logic Package Information".

Triple 2-channel analog multiplexer/demultiplexer with latch

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PIN DESCRIPTION

| PIN NO. | SYMBOL | NAME AND FUNCTION |
|------------|-----------------------------------|---------------------------------|
| 2, 1 | 2Y ₀ , 2Y ₁ | independent inputs/outputs |
| 5 | 3Z | common input/output |
| 6, 4 | 3Y ₀ , 3Y ₁ | independent inputs/outputs |
| 3, 14 | n.c. | not connected |
| 7 | \bar{E}_1 | enable input (active LOW) |
| 8 | E ₂ | enable input (active HIGH) |
| 9 | V _{EE} | negative supply voltage |
| 10 | GND | ground (0 V) |
| 11 | $\bar{L}\bar{E}$ | latch enable input (active LOW) |
| 15, 13, 12 | S ₁ to S ₃ | select inputs |
| 16, 17 | 1Y ₀ , 1Y ₁ | independent inputs/outputs |
| 18 | 1Z | common input/output |
| 19 | 2Z | common input/output |
| 20 | V _{CC} | positive supply voltage |



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FUNCTION TABLE

| INPUTS | | | | CHANNEL ON |
|-------------|-------|------------|-------|-------------|
| \bar{E}_1 | E_2 | \bar{LE} | S_n | |
| H | H | X | X | none |
| X | L | X | X | none |
| L | H | H | L | $nY_0 - nZ$ |
| L | H | H | H | $nY_1 - nZ$ |
| L | H | L | X | (1) |
| X | X | ↓ | X | (2) |

Notes

1. Last selected channel "ON".
2. Selected channels latched.

H = HIGH voltage level

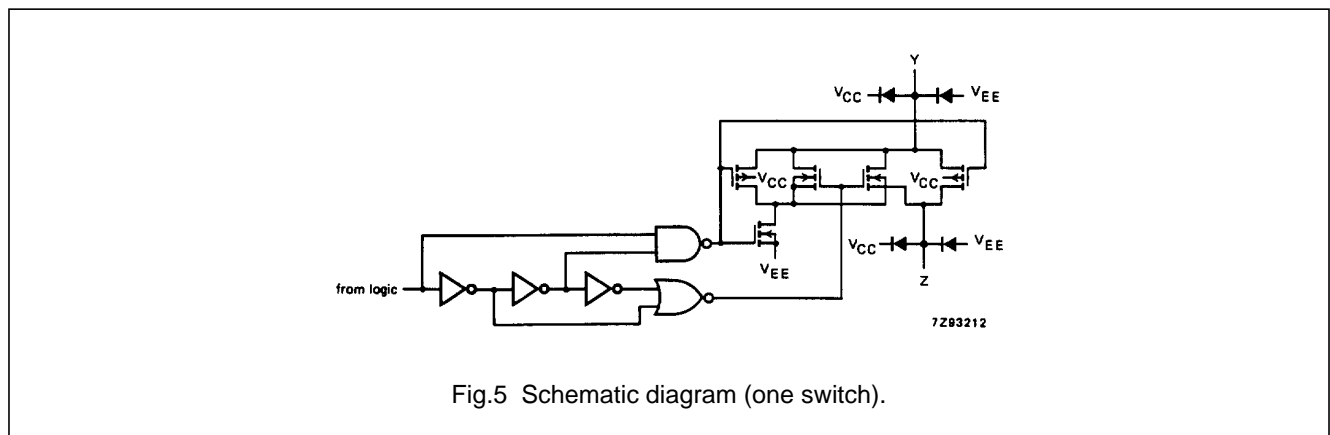
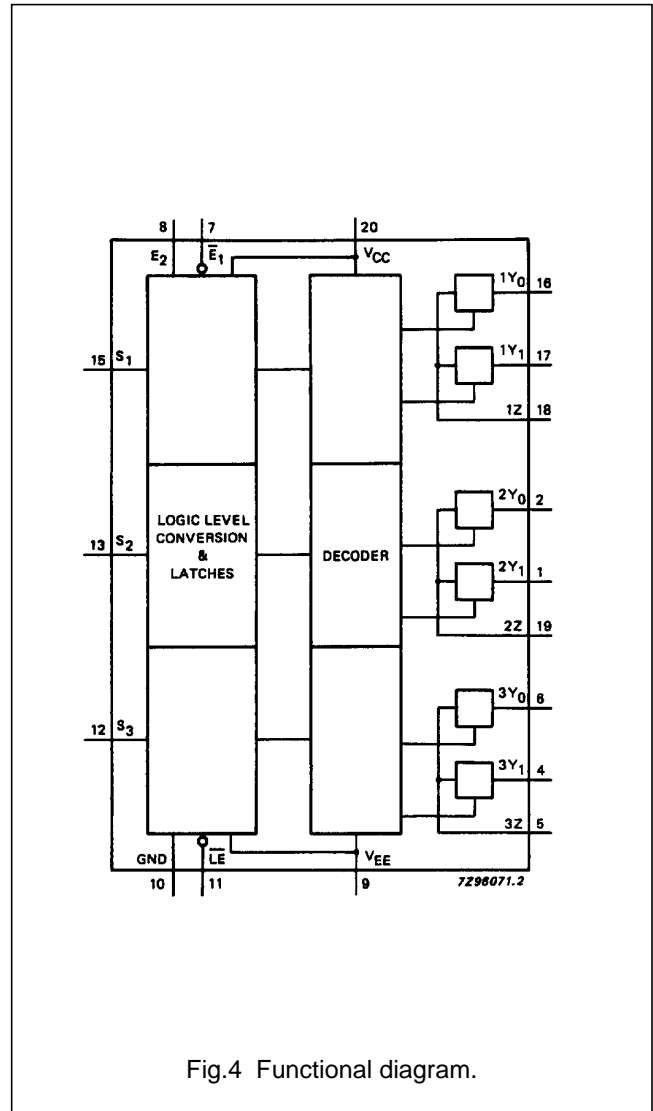
L = LOW voltage level

X = don't care

↓ = HIGH-to-LOW \bar{LE} transition

APPLICATIONS

- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating



Triple 2-channel analog multiplexer/demultiplexer with latch

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RATINGS

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

Voltages are referenced to $V_{EE} = \text{GND}$ (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 $V_I < -0.5 \text{ V}$ or $V_I > V_{CC} + 0.5 \text{ V}$ |
| $\pm I_{SK}$ | DC switch diode current | | 20 | mA | for $V_S < -0.5 \text{ V}$ or $V_S > V_{CC} + 0.5 \text{ V}$ |
| $\pm I_S$ | DC switch current | | 25 | mA | for $-0.5 \text{ V} < V_S < V_{CC} + 0.5 \text{ V}$ |
| $\pm I_{EE}$ | DC V_{EE} current | | 20 | mA | |
| $\pm I_{CC}$; $\pm I_{GND}$ | 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 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 ratings

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

RECOMMENDED OPERATING CONDITIONS

| SYMBOL | PARAMETER | 74HC | | | 74HCT | | | UNIT | CONDITIONS |
|------------|---------------------------------------|----------|------|---------------------------|----------|------|----------|------|---|
| | | min. | typ. | max. | min. | typ. | max. | | |
| V_{CC} | DC supply voltage $V_{CC}-\text{GND}$ | 2.0 | 5.0 | 10.0 | 4.5 | 5.0 | 5.5 | V | see Figs 6 and 7 |
| V_{CC} | DC supply voltage $V_{CC}-V_{EE}$ | 2.0 | 5.0 | 10.0 | 2.0 | 5.0 | 10.0 | V | see Figs 6 and 7 |
| V_I | DC input voltage range | GND | | V_{CC} | GND | | V_{CC} | V | |
| V_S | DC switch voltage range | V_{EE} | | V_{CC} | V_{EE} | | V_{CC} | V | |
| T_{amb} | operating ambient temperature range | -40 | | +85 | -40 | | +85 | °C | see DC and AC CHARACTER- ISTICS |
| T_{amb} | operating ambient temperature range | -40 | | +125 | -40 | | +125 | °C | |
| t_r, t_f | input rise and fall times | | 6.0 | 1000 500 400 250 | | 6.0 | 500 | ns | $V_{CC} = 2.0 \text{ V}$ $V_{CC} = 4.5 \text{ V}$ $V_{CC} = 6.0 \text{ V}$ $V_{CC} = 10.0 \text{ V}$ |

Triple 2-channel analog multiplexer/demultiplexer with latch

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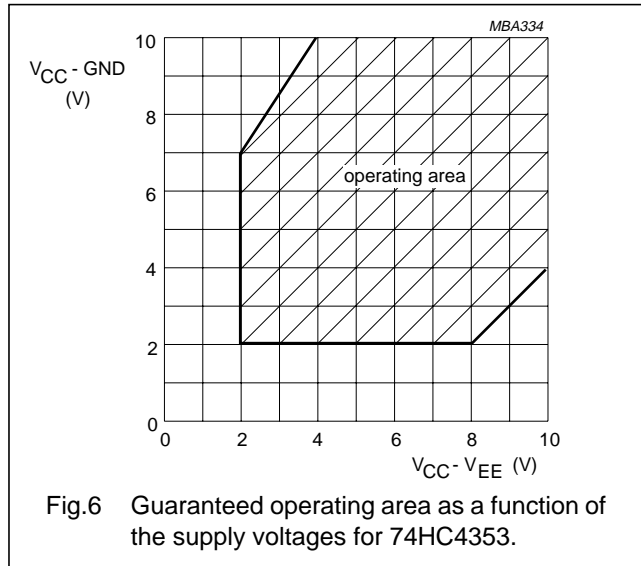


Fig.6 Guaranteed operating area as a function of the supply voltages for 74HC4353.

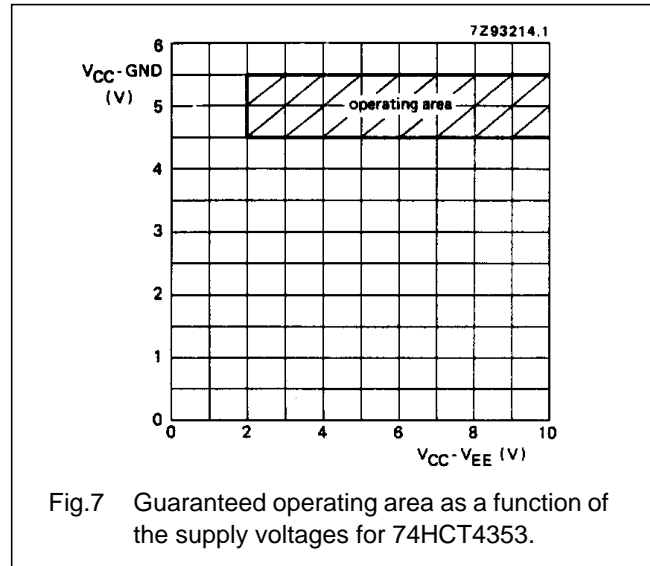


Fig.7 Guaranteed operating area as a function of the supply voltages for 74HCT4353.

DC CHARACTERISTICS FOR 74HC/HCT

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

For 74HCT: $V_{CC} - GND = 4.5$ and 5.5 V; $V_{CC} - V_{EE} = 2.0, 4.5, 6.0$ and 9.0 V

| SYMBOL | PARAMETER | T_{amb} (°C) | | | | | | UNIT | TEST CONDITIONS | | | | | |
|-----------------|---|----------------|------|------|------------|------|-------------|------|-----------------|-----------------|---------------------|----------|----------------------------|----------------------------|
| | | 74HC/HCT | | | | | | | V_{CC} (V) | V_{EE} (V) | I_s (μ A) | V_{is} | V_I | |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | | | |
| | | min. | typ. | max. | min. | max. | min. | | | | | | | max. |
| R_{ON} | ON resistance (peak) | | — | — | | — | | — | Ω | 2.0 | 0 | 100 | V_{CC} to V_{EE} | V_{IN} or V_{IL} |
| | | | 100 | 180 | | 225 | | 270 | Ω | 4.5 | 0 | 1000 | | |
| | | | 90 | 160 | | 200 | | 240 | Ω | 6.0 | 0 | 1000 | | |
| | | | 70 | 130 | | 165 | | 195 | Ω | 4.5 | -4.5 | 1000 | | |
| R_{ON} | ON resistance (rail) | | 150 | — | | — | | — | Ω | 2.0 | 0 | 100 | V_{EE} | V_{IH} or V_{IL} |
| | | | 80 | 140 | | 175 | | 210 | Ω | 4.5 | 0 | 1000 | | |
| | | | 70 | 120 | | 150 | | 180 | Ω | 6.0 | 0 | 1000 | | |
| | | | 60 | 105 | | 130 | | 160 | Ω | 4.5 | -4.5 | 1000 | | |
| R_{ON} | ON resistance | | 150 | — | | — | | — | Ω | 2.0 | 0 | 100 | V_{CC} | V_{IH} or V_{IL} |
| | | | 90 | 160 | | 200 | | 240 | Ω | 4.5 | 0 | 1000 | | |
| | | | 80 | 140 | | 175 | | 210 | Ω | 6.0 | 0 | 1000 | | |
| | | | 65 | 120 | | 150 | | 180 | Ω | 4.5 | -4.5 | 1000 | | |
| ΔR_{ON} | maximum Δ ON resistance between any two channels | | — | | | | | | Ω | 2.0 | 0 | | V_{CC} to V_{EE} | V_{IH} or V_{IL} |
| | | | 9 | | | | | | Ω | 4.5 | 0 | | | |
| | | | 8 | | | | | | Ω | 6.0 | 0 | | | |
| | | | 6 | | | | | | Ω | 4.5 | -4.5 | | | |

Notes to DC characteristics

- At supply voltages ($V_{CC} - V_{EE}$) approaching 2.0 V the analog switch ON-resistance becomes extremely non-linear. There it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.
- For test circuit measuring R_{ON} see Fig.8.

Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

DC CHARACTERISTICS FOR 74HC

Voltages are referenced to GND (ground = 0 V)

| SYMBOL | PARAMETER | T_{amb} (°C) | | | | | | UNIT | TEST CONDITIONS | | | | |
|-----------|--|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------|--------------------------|--------|----------------------------|--|
| | | 74HC | | | | | | | V_{CC} (V) | V_{EE} (V) | V_I | OTHER | |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | | |
| | | min. | typ. | max. | min. | max. | min. | | | | | | max. |
| V_{IH} | HIGH level input voltage | 1.5 3.15 4.2 6.3 | 1.2 2.4 3.2 4.7 | | 1.5 3.15 4.2 6.3 | | 1.5 3.15 4.2 6.3 | | V | 2.0 4.5 6.0 9.0 | | | |
| V_{IL} | LOW level input voltage | | 0.8 2.1 2.8 4.3 | 0.5 1.35 1.8 2.7 | | 0.5 1.35 1.8 2.7 | | 0.5 1.35 1.8 2.7 | V | 2.0 4.5 6.0 9.0 | | | |
| $\pm I_I$ | input leakage current | | | 0.1 0.2 | | 1.0 2.0 | | 1.0 2.0 | μA | 6.0 10.0 | 0 0 | V_{CC} or GND | |
| $\pm I_S$ | analog switch OFF-state current per channel | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ (see Fig.10) |
| $\pm I_S$ | analog switch OFF-state current all channels | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ (see Fig.10) |
| $\pm I_S$ | analog switch ON-state current | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ (see Fig.11) |
| I_{CC} | quiescent supply current | | | 8.0 16.0 | | 80.0 160.0 | | 160.0 320.0 | μA | 6.0 10.0 | 0 0 | V_{CC} or GND | $V_{is} = V_{EE}$ or V_{CC} ; $V_{os} = V_{CC}$ or V_{EE} |

Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

AC CHARACTERISTICS FOR 74HCGND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF

| SYMBOL | PARAMETER | T_{amb} (°C) | | | | | | | | UNIT | TEST CONDITIONS | | |
|-------------------|---|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----|--------------------------|---------------------|---|-------|
| | | 74HC | | | | | | | | | V_{CC} (V) | V_{EE} (V) | OTHER |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | | | |
| t_{PHL}/t_{PLH} | propagation delay V_{is} to V_{os} | | 14 5 4 4 | 60 12 10 8 | | 75 15 13 10 | | 90 18 15 12 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = \infty$; $C_L = 50$ pF (see Fig.18) | |
| t_{PZH}/t_{PZL} | turn "ON" time $\bar{E}_1; E_2$ to V_{os} | | 61 22 18 18 | 250 50 43 40 | | 315 63 54 50 | | 375 75 64 60 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.19) | |
| t_{PZH}/t_{PZL} | turn "ON" time \bar{LE} to V_{os} | | 55 20 16 17 | 200 40 34 40 | | 250 50 43 50 | | 300 60 51 60 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.19) | |
| t_{PZH}/t_{PZL} | turn "ON" time S_n to V_{os} | | 61 22 18 17 | 225 45 38 40 | | 280 56 48 50 | | 340 68 58 60 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.19) | |
| t_{PHZ}/t_{PLZ} | turn "OFF" time $\bar{E}_1; E_2$ to V_{os} | | 66 24 19 19 | 250 50 43 40 | | 315 63 54 50 | | 375 75 64 60 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.19) | |
| t_{PHZ}/t_{PLZ} | turn "OFF" time S_n to V_{os} ; \bar{LE} to V_{os} | | 55 20 16 19 | 200 40 34 40 | | 250 50 43 50 | | 300 60 51 60 | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.19) | |
| t_{su} | set-up time S_n to \bar{LE} | 60 12 10 18 | 17 6 5 8 | | 75 15 13 23 | | 90 18 15 27 | | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.20) | |
| t_h | hold time S_n to \bar{LE} | 5 5 5 5 | -6 -2 -2 -3 | | 5 5 5 5 | | 5 5 5 5 | | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.20) | |
| t_w | \bar{LE} minimum pulse width HIGH | 80 16 14 16 | 11 4 3 6 | | 100 20 17 20 | | 120 24 20 24 | | ns | 2.0 4.5 6.0 4.5 | 0 0 0 -4.5 | $R_L = 1$ k Ω ; $C_L = 50$ pF (see Fig.20) | |

Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

DC CHARACTERISTICS FOR 74HCT

Voltages are referenced to GND (ground = 0 V)

| SYMBOL | PARAMETER | T_{amb} (°C) | | | | | | | UNIT | TEST CONDITIONS | | | |
|-----------------|---|----------------|------|-------------|------------|---------------|-------------|----------------|---------|-----------------|-----------------|----------------------------|---|
| | | 74HCT | | | | | | | | V_{CC} (V) | V_{EE} (V) | V_I | OTHER |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | | | |
| V_{IH} | HIGH level input voltage | 2.0 | 1.6 | | 2.0 | | 2.0 | | V | 4.5 to 5.5 | | | |
| V_{IL} | LOW level input voltage | | 1.2 | 0.8 | | 0.8 | | 0.8 | V | 4.5 to 5.5 | | | |
| $\pm I_I$ | input leakage current | | | 0.1 | | 1.0 | | 1.0 | μA | 5.5 | 0 | V_{CC} or GND | |
| $\pm I_S$ | analog switch OFF-state current per channel | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ Fig.10 |
| $\pm I_S$ | analog switch OFF-state current all channels | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ Fig.10 |
| $\pm I_S$ | analog switch ON-state current | | | 0.1 | | 1.0 | | 1.0 | μA | 10.0 | 0 | V_{IH} or V_{IL} | $ V_S = V_{CC} - V_{EE}$ Fig.11 |
| I_{CC} | quiescent supply current | | | 8.0 16.0 | | 80.0 160.0 | | 160.0 320.0 | μA | 5.5 5.0 | 0 -5.0 | V_{CC} or GND | $V_{is} = V_{EE}$ or V_{CC} ; $V_{os} = V_{CC}$ or V_{EE} |
| ΔI_{CC} | 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 | 0 | V_{CC} -2.1 V | other inputs at V_{CC} or GND |

Note to HCT types

- The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given here.
To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

| INPUT | UNIT LOAD COEFFICIENT |
|-----------------------|-----------------------|
| \overline{E}_1, E_2 | 0.50 |
| S_n | 0.50 |
| \overline{LE} | 1.5 |

Triple 2-channel analog multiplexer/demultiplexer with latch

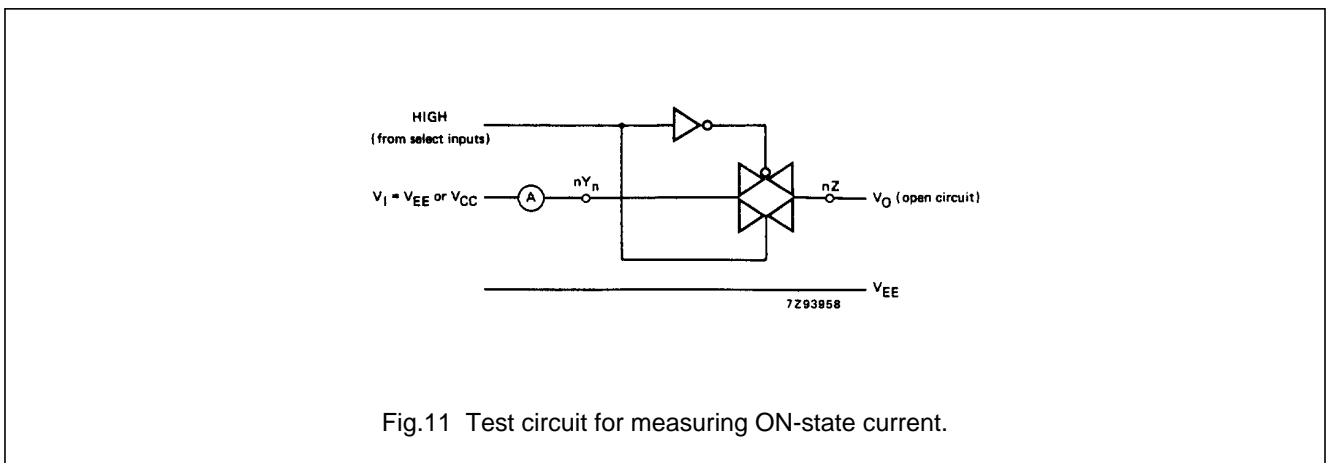
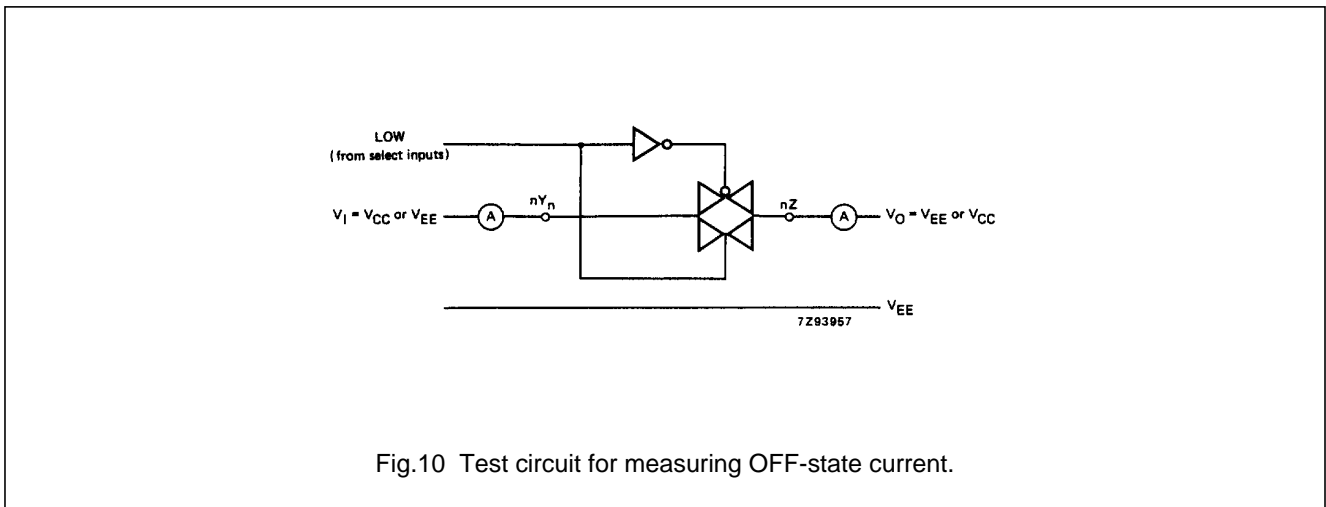
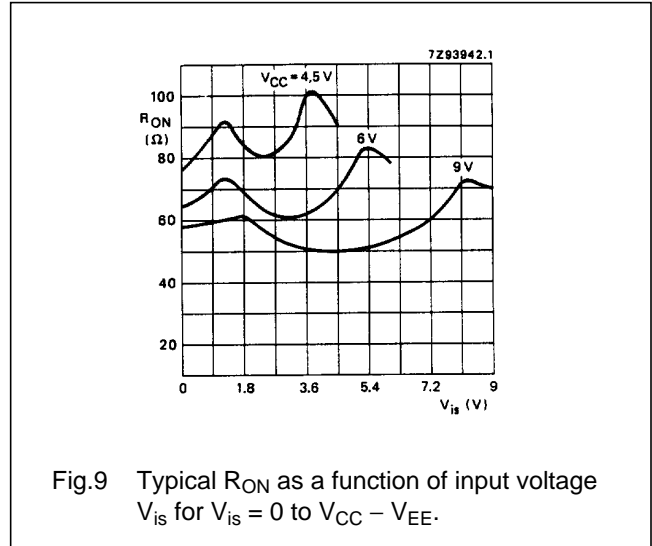
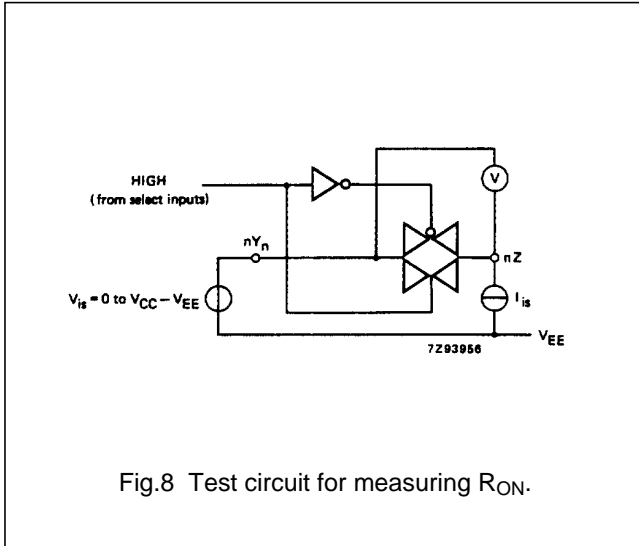
74HC/HCT4353

AC CHARACTERISTICS FOR 74HCTGND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF

| SYMBOL | PARAMETER | T _{amb} (°C) | | | | | | | | UNIT | TEST CONDITIONS | | |
|-------------------------------------|---|-----------------------|----------|----------|------------|----------|-------------|----------|----|------------|------------------------|--|-------|
| | | 74HCT | | | | | | | | | V _{CC} (V) | V _{EE} (V) | OTHER |
| | | +25 | | | -40 to +85 | | -40 to +125 | | | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | | | |
| t _{PHL} / t _{PLH} | propagation delay V _{is} to V _{os} | | 5 4 | 12 8 | | 15 10 | | 18 12 | ns | 4.5 4.5 | 0 -4.5 | R _L = ∞; C _L = 50 pF (see Fig.18) | |
| t _{PZH} / t _{PZL} | turn "ON" time \overline{E}_1 to V _{os} | | 26 22 | 55 45 | | 69 56 | | 83 68 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PZH} / t _{PZL} | turn "ON" time E ₂ to V _{os} | | 22 18 | 50 40 | | 63 50 | | 75 60 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PZH} / t _{PZL} | turn "ON" time \overline{LE} to V _{os} | | 21 17 | 45 40 | | 56 50 | | 68 60 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PZH} / t _{PZL} | turn "ON" time S _n to V _{os} | | 25 19 | 50 45 | | 63 56 | | 75 68 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PHZ} / t _{PLZ} | turn "OFF" time \overline{E}_1 to V _{os} | | 23 19 | 50 40 | | 63 50 | | 75 60 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PHZ} / t _{PLZ} | turn "OFF" time E ₂ to V _{os} | | 27 23 | 50 40 | | 63 50 | | 75 60 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PHZ} / t _{PLZ} | turn "OFF" time \overline{LE} to V _{os} | | 19 19 | 40 40 | | 50 50 | | 60 60 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{PHZ} / t _{PLZ} | turn "OFF" time S _n to V _{os} | | 22 22 | 45 45 | | 56 56 | | 68 68 | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.19) | |
| t _{su} | set-up time S _n to \overline{LE} | 12 15 | 7 9 | | 15 19 | | 18 22 | | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.20) | |
| t _h | hold time S _n to \overline{LE} | 5 5 | 0 -2 | | 5 5 | | 5 5 | | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.20) | |
| t _w | \overline{LE} minimum pulse width HIGH | 16 16 | 3 5 | | 20 20 | | 24 24 | | ns | 4.5 4.5 | 0 -4.5 | R _L = 1 kΩ; C _L = 50 pF (see Fig.20) | |

Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353



Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

ADDITIONAL AC CHARACTERISTICS FOR 74HC/HCT

Recommended conditions and typical values

GND = 0 V; T_{amb} = 25 °C

| SYMBOL | PARAMETER | typ. | UNIT | V _{CC} (V) | V _{EE} (V) | V _{is(p-p)} (V) | CONDITIONS |
|--------------------|---|--------------|------------|---------------------|---------------------|--------------------------|--|
| | sine-wave distortion f = 1 kHz | 0.04 0.02 | % % | 2.25 4.5 | -2.25 -4.5 | 4.0 8.0 | R _L = 10 kΩ; C _L = 50 pF (see Fig.14) |
| | sine-wave distortion f = 10 kHz | 0.12 0.06 | % % | 2.25 4.5 | -2.25 -4.5 | 4.0 8.0 | R _L = 10 kΩ; C _L = 50 pF (see Fig.14) |
| | switch "OFF" signal feed-through | -50 -50 | dB dB | 2.25 4.5 | -2.25 -4.5 | note 1 | R _L = 600 Ω; C _L = 50 pF f = 1 MHz (see Figs 12 and 15) |
| | crosstalk between any two switches/ multiplexers | -60 -60 | dB dB | 2.25 4.5 | -2.25 -4.5 | note 1 | R _L = 600 Ω; C _L = 50 pF; f = 1 MHz (see Fig.16) |
| V _(p-p) | crosstalk voltage between control and any switch (peak-to-peak value) | 110 220 | mV mV | 4.5 4.5 | 0 -4.5 | | R _L = 600 Ω; C _L = 50 pF; f = 1 MHz (\bar{E}_1, E_2 or S _n , square-wave between V _{CC} and GND, t _r = t _f = 6 ns) (see Fig.17) |
| f _{max} | minimum frequency response (-3dB) | 160 170 | MHz MHz | 2.25 4.5 | -2.25 -4.5 | note 2 | R _L = 50 Ω; C _L = 10 pF (see Figs 13 and 14) |
| C _S | maximum switch capacitance independent (Y) common (Z) | 5 12 | pF pF | | | | |

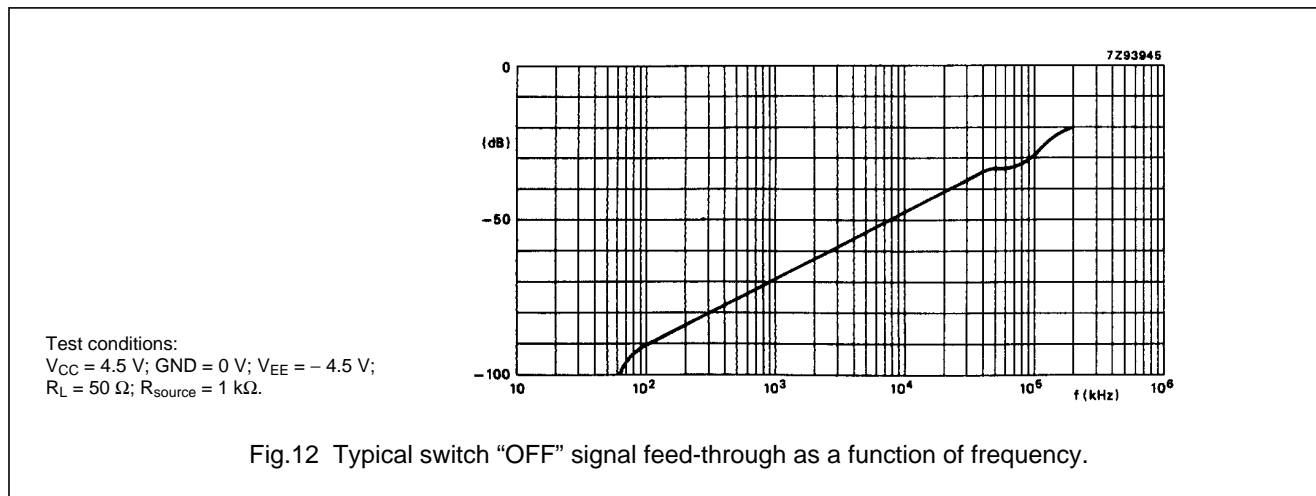
Notes to the AC characteristics

1. Adjust input voltage V_{is} to 0 dBm level (0 dBm = 1 mW into 600 Ω).
2. Adjust input voltage V_{is} to 0 dBm level at V_{os} for 1 MHz (0 dBm = 1 mW into 50 Ω).

General note

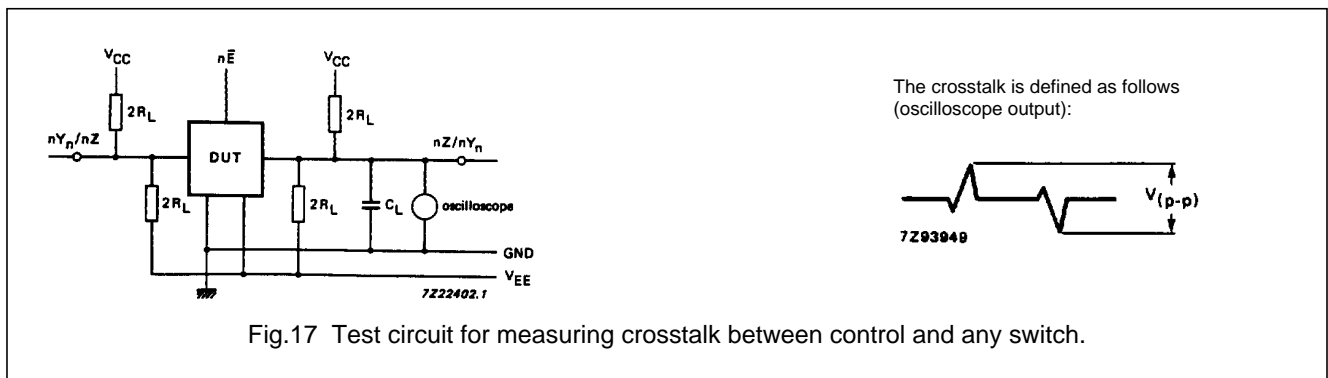
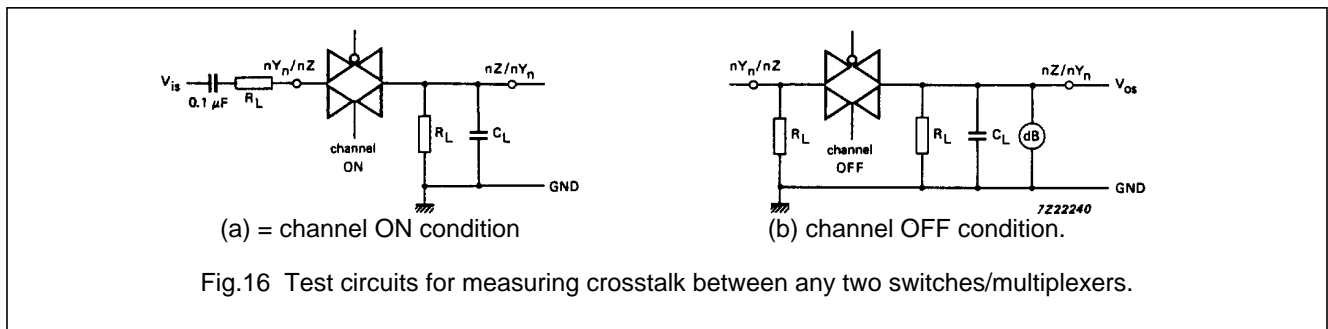
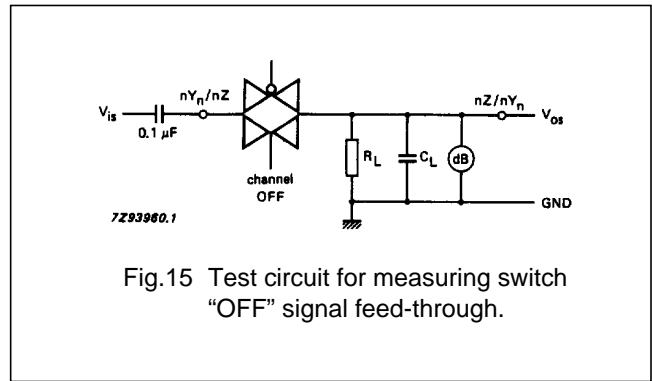
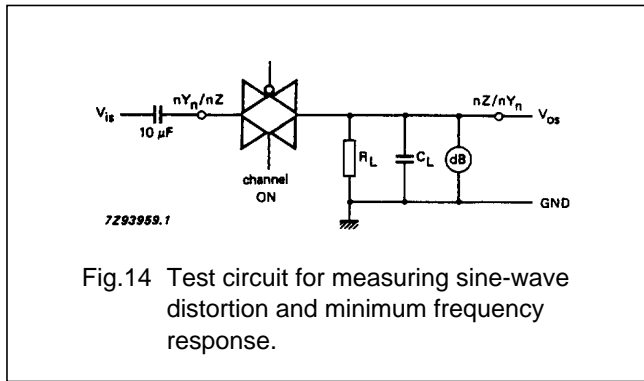
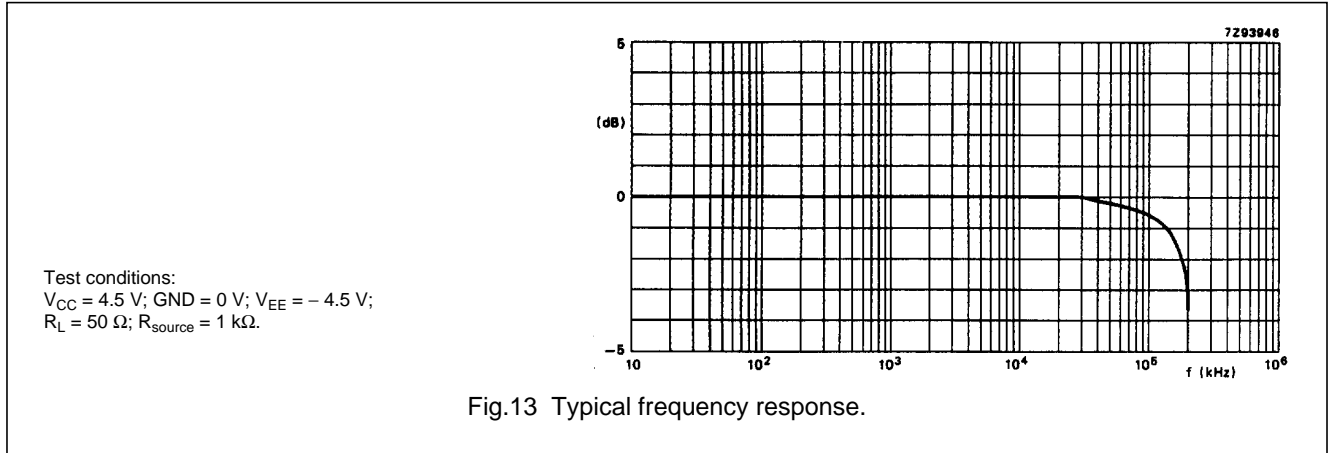
V_{is} is the input voltage at an nY_n or nZ terminal, whichever is assigned as an input.

V_{os} is the output voltage at an nY_n or nZ terminal, whichever is assigned as an output.



Triple 2-channel analog multiplexer/demultiplexer with latch

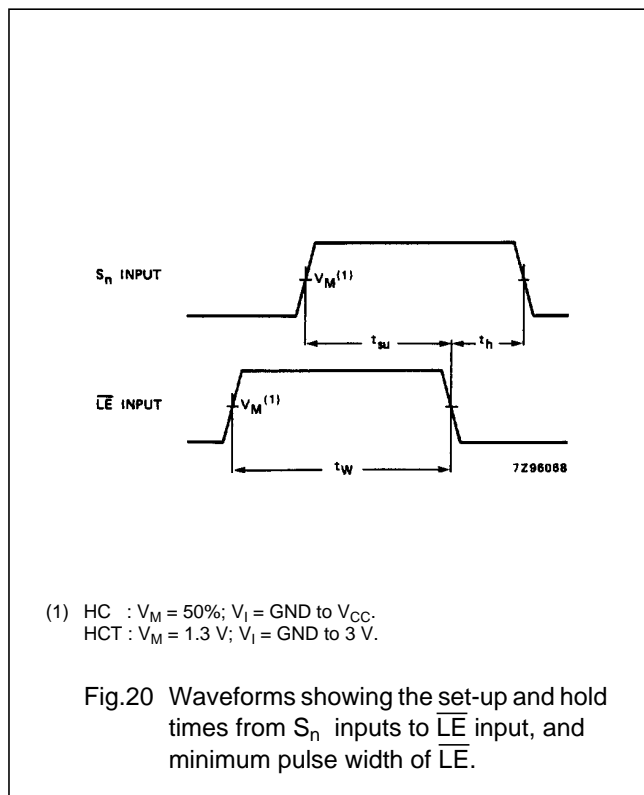
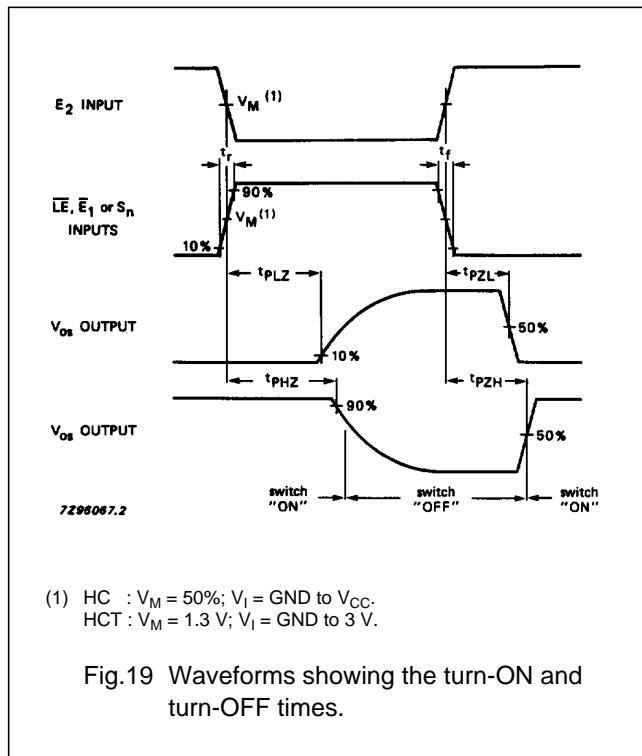
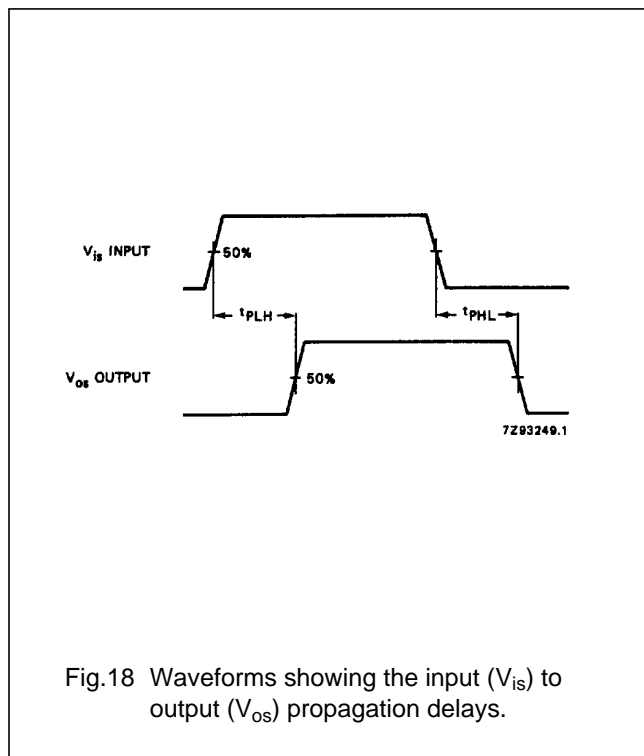
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Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

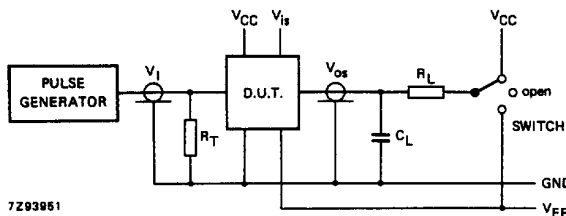
AC WAVEFORMS



Triple 2-channel analog multiplexer/demultiplexer with latch

74HC/HCT4353

TEST CIRCUIT AND WAVEFORMS



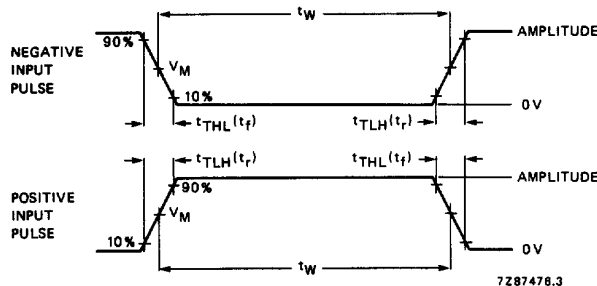
Conditions

| TEST | SWITCH | V _{is} |
|------------------|-----------------|-----------------|
| t _{PZH} | V _{EE} | V _{CC} |
| t _{PZL} | V _{CC} | V _{EE} |
| t _{PHZ} | V _{EE} | V _{CC} |
| t _{PLZ} | V _{CC} | V _{EE} |
| others | open | pulse |

| FAMILY | AMPLITUDE | V _M | t _r ; t _f | |
|--------|-----------------|----------------|---------------------------------|-------|
| | | | f _{max} ; PULSE WIDTH | OTHER |
| 74HC | V _{CC} | 50% | < 2 ns | 6 ns |
| 74HCT | 3.0 V | 1.3 V | < 2 ns | 6 ns |

- C_L = load capacitance including jig and probe capacitance (see AC CHARACTERISTICS for values).
- R_T = termination resistance should be equal to the output impedance Z_O of the pulse generator.
- t_r = t_f = 6 ns; when measuring f_{max}, there is no constraint on t_r, t_f with 50% duty factor.

Fig.21 Test circuit for measuring AC performance.



Conditions

| TEST | SWITCH | V _{is} |
|------------------|-----------------|-----------------|
| t _{PZH} | V _{EE} | V _{CC} |
| t _{PZL} | V _{CC} | V _{EE} |
| t _{PHZ} | V _{EE} | V _{CC} |
| t _{PLZ} | V _{CC} | V _{EE} |
| others | open | pulse |

| FAMILY | AMPLITUDE | V _M | t _r ; t _f | |
|--------|-----------------|----------------|---------------------------------|-------|
| | | | f _{max} ; PULSE WIDTH | OTHER |
| 74HC | V _{CC} | 50% | < 2 ns | 6 ns |
| 74HCT | 3.0 V | 1.3 V | < 2 ns | 6 ns |

- C_L = load capacitance including jig and probe capacitance (see AC CHARACTERISTICS for values).
- R_T = termination resistance should be equal to the output impedance Z_O of the pulse generator.
- t_r = t_f = 6 ns; when measuring f_{max}, there is no constraint on t_r, t_f with 50% duty factor.

Fig.22 Input pulse definitions.

Triple 2-channel analog
multiplexer/demultiplexer with latch

74HC/HCT4353

PACKAGE OUTLINES

See *"74HC/HCT/HCU/HCMOS Logic Package Outlines"*.



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