



74HC4351; 74HCT4351

8-channel analog multiplexer/demultiplexer with latch

Rev. 6 — 25 July 2024

Product data sheet

1. General description

The 74HC4351; 74HCT4351 is a single-pole octal-throw analog switch (SP8T) suitable for use in analog or digital 8:1 multiplexer/demultiplexer applications. The switch features three digital select inputs (S0 to S2), eight independent inputs/outputs (Yn), a common input/output (Z) and two digital enable inputs (E1 and E2). With E1 LOW and E2 HIGH, one of the eight switches is selected (low impedance ON-state) by S0 to S2. The data at the select inputs may be latched by using the latch enable input (\overline{LE}). When \overline{LE} is HIGH the latch is transparent. When $\overline{E1}$ is HIGH or E2 is LOW all 8 analog switches are turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC} .

2. Features and benefits

- Wide analog input voltage range from -5 V to +5 V
- Complies with JEDEC standard no. 7A
- Low ON resistance:
 - 80 Ω (typical) at $V_{CC} - V_{EE} = 4.5$ V
 - 70 Ω (typical) at $V_{CC} - V_{EE} = 6.0$ V
 - 60 Ω (typical) 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
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Applications

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

4. Ordering information

Table 1. Ordering information

| Type number | Package | | | |
|---|-------------------|---------|---|--------------------------|
| | Temperature range | Name | Description | Version |
| 74HC4351D 74HCT4351D | -40 °C to +125 °C | SO20 | plastic small outline package; 20 leads; body width 7.5 mm | SOT163-1 |
| 74HC4351PW | -40 °C to +125 °C | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | SOT360-1 |

5. Functional diagram

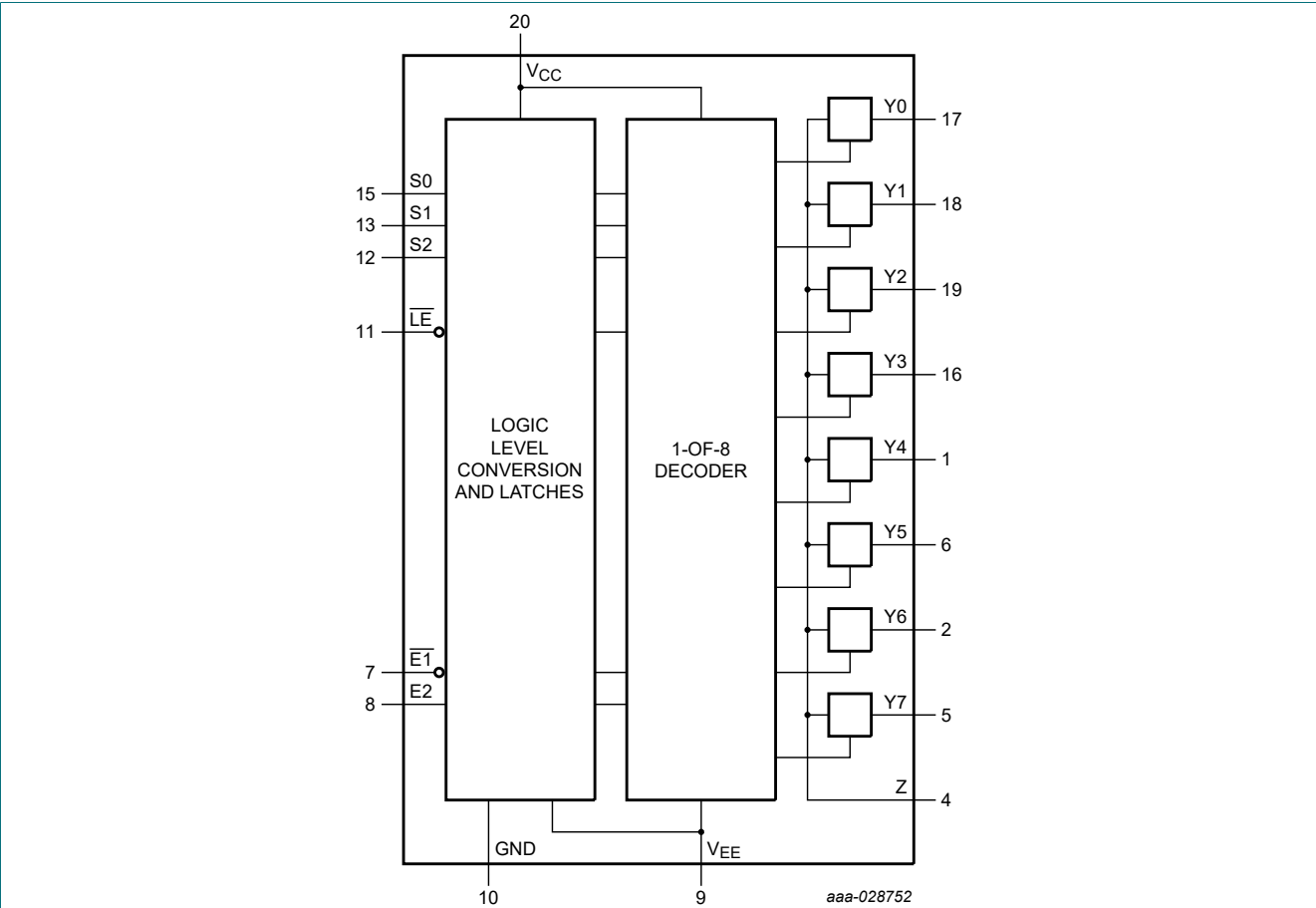


Fig. 1. Functional diagram

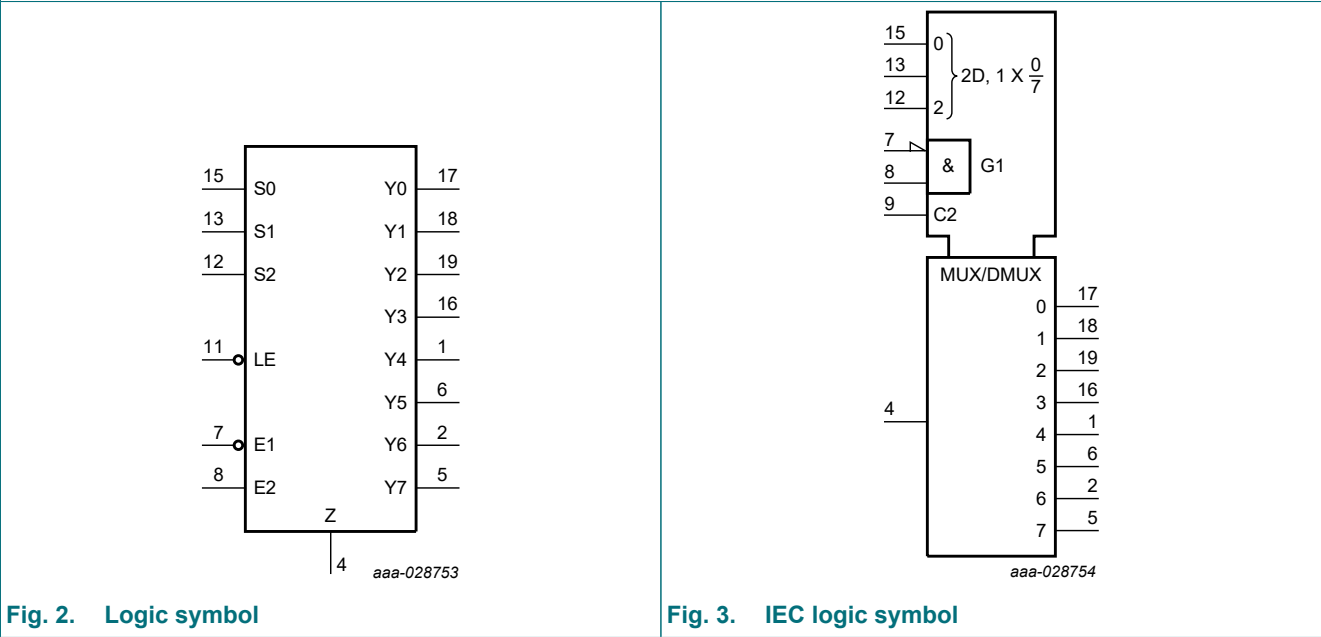


Fig. 2. Logic symbol

Fig. 3. IEC logic symbol

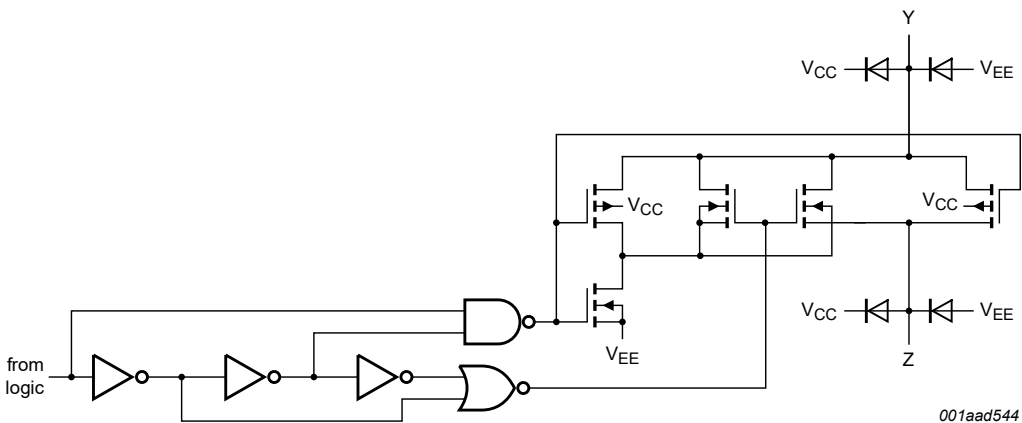
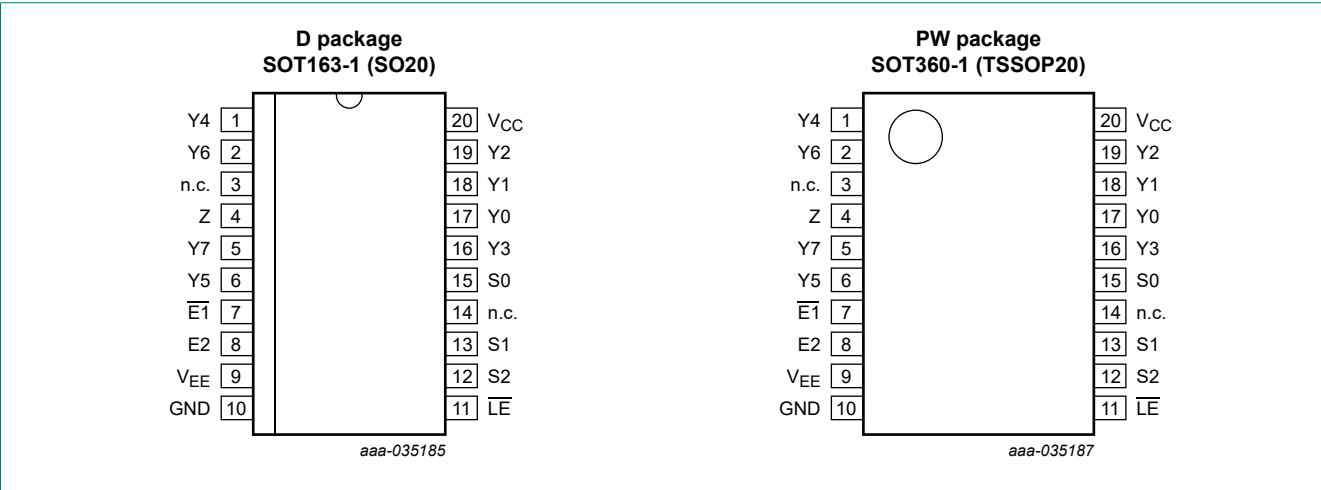


Fig. 4. Schematic diagram (one switch)

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|--------------------------------|----------------------------|---------------------------------|
| E1 | 7 | enable input (active LOW) |
| E2 | 8 | enable input (active HIGH) |
| LE | 11 | latch enable input (active LOW) |
| S0, S1, S2 | 15, 13, 12 | select inputs |
| Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7 | 17, 18, 19, 16, 1, 6, 2, 5 | independent input or output |
| Z | 4 | common output or input |
| VEE | 9 | supply voltage |
| GND | 10 | ground (0 V) |
| VCC | 20 | supply voltage |
| n.c. | 3, 14 | not connected |

7. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; ↓ = HIGH-to-LOW LE transition.

| Input | | | | | | Channel ON |
|-------|----|----|----|----|----|----------------------------|
| E1 | E2 | LE | S2 | S1 | S0 | |
| H | X | X | X | X | X | none |
| X | L | X | X | X | X | none |
| L | H | H | L | L | L | Y0 |
| L | H | H | L | L | H | Y1 |
| L | H | H | L | H | L | Y2 |
| L | H | H | L | H | H | Y3 |
| L | H | H | H | L | L | Y4 |
| L | H | H | H | L | H | Y5 |
| L | H | H | H | H | L | Y6 |
| L | H | H | H | H | H | Y7 |
| L | H | L | X | X | X | last selected channel "ON" |
| X | X | ↓ | X | X | X | select channels latched |

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to V_{SS} = 0 V (ground).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|---|------|-------|------|
| V _{CC} | supply voltage | [1] | -0.5 | +11.0 | V |
| I _{IK} | input clamping current | V _I < -0.5 V or V _I > V _{CC} + 0.5 V | - | ±20 | mA |
| I _{SK} | switch clamping current | V _{SW} < -0.5 V or V _{SW} > V _{CC} + 0.5 V | - | ±20 | mA |
| I _{SW} | switch current | -0.5 V < V _{SW} < V _{CC} + 0.5 V | - | ±25 | mA |
| I _{EE} | supply current | | - | ±20 | mA |
| I _{CC} | supply current | | - | 50 | mA |
| I _{GND} | ground current | | -50 | - | mA |
| T _{stg} | storage temperature | | -65 | +150 | °C |
| P _{tot} | total power dissipation | T _{amb} = -40 °C to +125 °C [2] | - | 500 | mW |
| P | power dissipation | per switch | - | 100 | mW |

- [1] To avoid drawing V_{CC} current out of terminal Z, when switch current flows into terminals Y_n, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no V_{CC} current will flow out of terminals Y_n. In this case there is no limit for the voltage drop across the switch, but the voltages at Y_n and Z may not exceed V_{CC} or V_{EE}.
- [2] For SOT163-1 (SO20) package: P_{tot} derates linearly with 12.3 mW/K above 109 °C.
For SOT360-1 (TSSOP20) package: P_{tot} derates linearly with 10.0 mW/K above 100 °C.

9. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol | Parameter | Conditions | 74HC4351 | | | 74HCT4351 | | | Unit |
|------------------|-------------------------------------|-----------------------------------|-----------------|------|-----------------|-----------------|------|-----------------|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| V _{CC} | supply voltage | see Fig. 5 and Fig. 6 | | | | | | | |
| | | V _{CC} - GND | 2.0 | 5.0 | 10.0 | 4.5 | 5.0 | 5.5 | V |
| | | V _{CC} - V _{EE} | 2.0 | 5.0 | 10.0 | 2.0 | 5.0 | 10.0 | V |
| V _I | input voltage | | GND | - | V _{CC} | GND | - | V _{CC} | V |
| V _{SW} | switch voltage | | V _{EE} | - | V _{CC} | V _{EE} | - | V _{CC} | V |
| T _{amb} | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | V _{CC} = 2.0 V | - | - | 625 | - | - | - | ns/V |
| | | V _{CC} = 4.5 V | - | 1.67 | 139 | - | 1.67 | 139 | ns/V |
| | | V _{CC} = 6.0 V | - | - | 83 | - | - | - | ns/V |
| | | V _{CC} = 10.0 V | - | - | 31 | - | - | - | ns/V |

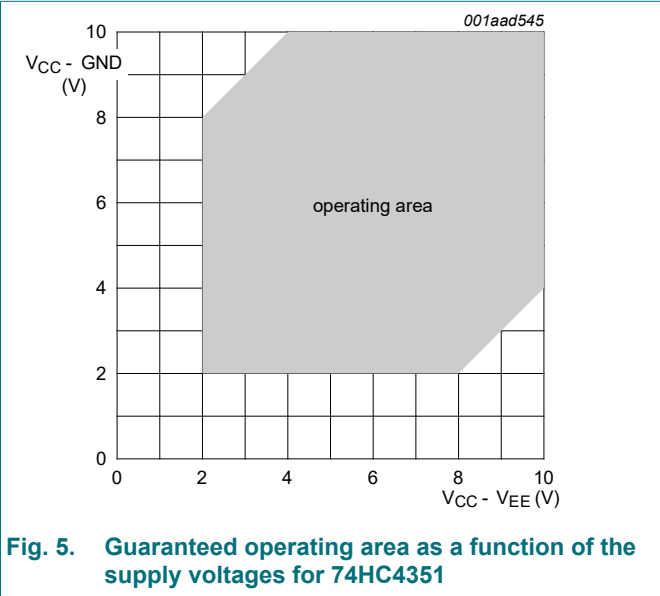


Fig. 5. Guaranteed operating area as a function of the supply voltages for 74HC4351

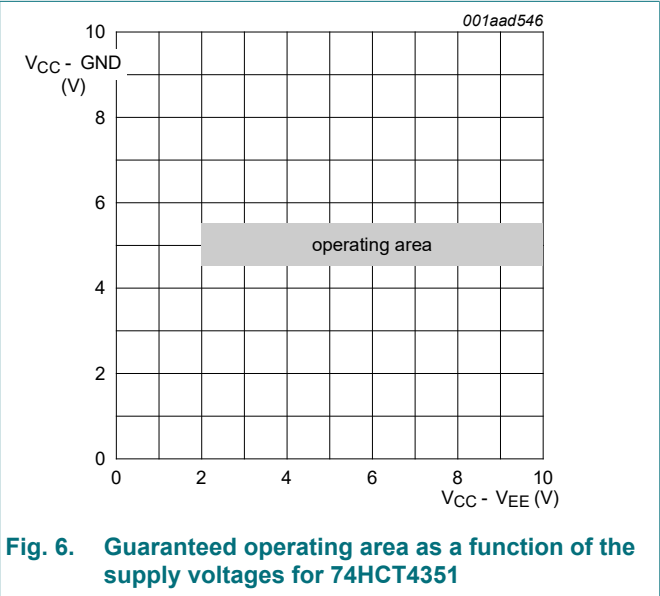


Fig. 6. Guaranteed operating area as a function of the supply voltages for 74HCT4351

10. Static characteristics

Table 6. R_{ON} resistance per latch for 74HC4351 and 74HCT4351

For test circuit, see Fig. 7

For 74HC4351: $V_I = V_{IH}$ or V_{IL} ; $V_{CC} - GND$ or $V_{CC} - V_{EE} = 2.0\text{ V}$, 4.5 V , 6.0 V and 9.0 V .

For 74HCT4351: $V_I = V_{IH}$ or V_{IL} ; $V_{CC} - GND = 4.5\text{ V}$ and 5.5 V , $V_{CC} - V_{EE} = 2.0\text{ V}$, 4.5 V , 6.0 V and 9.0 V .

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------|---|---|-------|-----|-----|------------------|-----|-------------------|-----|----------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_{is} = V_{CC}$ to V_{EE} [1] | | | | | | | | |
| | | $V_{CC} = 2.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 100\text{ }\mu\text{A}$ [2] | - | - | - | - | - | - | - | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 100 | 180 | - | 225 | - | 270 | Ω |
| | | $V_{CC} = 6.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 90 | 160 | - | 200 | - | 240 | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 70 | 130 | - | 165 | - | 195 | Ω |
| $R_{ON(rail)}$ | ON resistance (rail) | $V_{is} = V_{EE}$ [1] | | | | | | | | |
| | | $V_{CC} = 2.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 100\text{ }\mu\text{A}$ [2] | - | 150 | - | - | - | - | - | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 80 | 140 | - | 175 | - | 210 | Ω |
| | | $V_{CC} = 6.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 70 | 120 | - | 150 | - | 180 | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 60 | 105 | - | 130 | - | 160 | Ω |
| | | $V_{is} = V_{CC}$ [1] | | | | | | | | |
| | | $V_{CC} = 2.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 100\text{ }\mu\text{A}$ [2] | - | 150 | - | - | - | - | - | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 90 | 160 | - | 200 | - | 240 | Ω |
| | | $V_{CC} = 6.0\text{ V}$; $V_{EE} = 0\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 80 | 140 | - | 175 | - | 210 | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$; $I_{SW} = 1000\text{ }\mu\text{A}$ | - | 65 | 120 | - | 150 | - | 180 | Ω |
| ΔR_{ON} | ON resistance mismatch between channels | $V_{is} = V_{CC}$ to V_{EE} [1] | | | | | | | | |
| | | $V_{CC} = 2.0\text{ V}$; $V_{EE} = 0\text{ V}$ [2] | - | - | - | - | - | - | - | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = 0\text{ V}$ | - | 9 | - | - | - | - | - | Ω |
| | | $V_{CC} = 6.0\text{ V}$; $V_{EE} = 0\text{ V}$ | - | 8 | - | - | - | - | - | Ω |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ | - | 6 | - | - | - | - | - | Ω |

[1] V_{is} is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[2] When supply voltages ($V_{CC} - V_{EE}$) near 2.0 V the analog switch ON resistance becomes extremely non-linear. When using a supply of 2 V , it is recommended to use these devices only for transmitting digital signals.

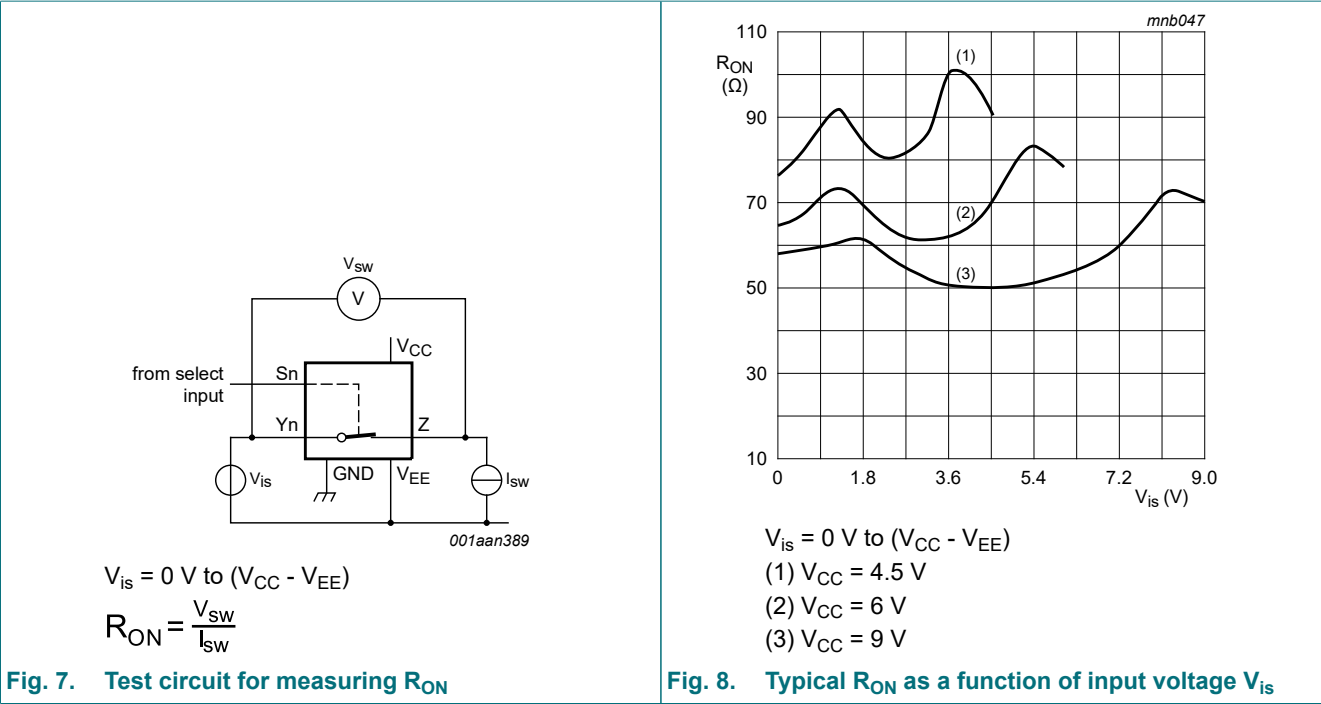


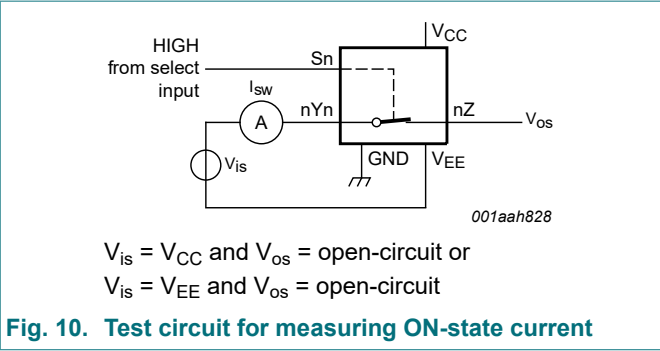
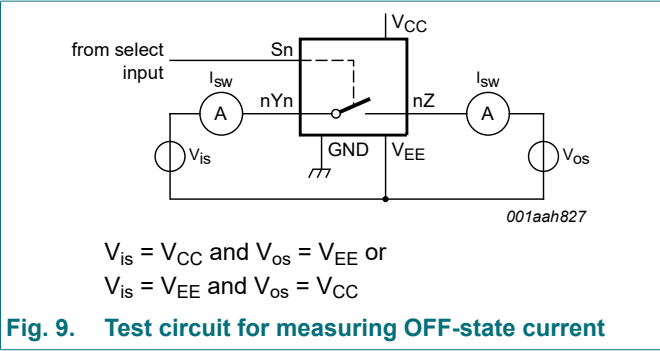
Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V);
 V_{is} is the input voltage at pins Y_n or Z , whichever is assigned as an input;
 V_{os} is the output voltage at pins Z or Y_n , whichever is assigned as an output.

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---------------------|---------------------------|---|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74HC4351 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | 1.2 | - | 1.5 | - | 1.5 | - | V |
| | | V _{CC} = 4.5 V | 3.15 | 2.4 | - | 3.15 | - | 3.15 | - | V |
| | | V _{CC} = 6.0 V | 4.2 | 3.2 | - | 4.2 | - | 4.2 | - | V |
| | | V _{CC} = 9.0 V | 6.3 | 4.7 | - | 6.3 | - | 6.3 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | 0.8 | 0.5 | - | 0.5 | - | 0.5 | V |
| | | V _{CC} = 4.5 V | - | 2.1 | 1.35 | - | 1.35 | - | 1.35 | V |
| | | V _{CC} = 6.0 V | - | 2.8 | 1.8 | - | 1.8 | - | 1.8 | V |
| | | V _{CC} = 9.0 V | - | 4.3 | 2.7 | - | 2.7 | - | 2.7 | V |
| I _I | input leakage current | V _{EE} = 0 V; V _I = V _{CC} or GND | | | | | | | | |
| | | V _{CC} = 6.0 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| | | V _{CC} = 10.0 V | - | - | ±0.2 | - | ±2.0 | - | ±2.0 | µA |
| I _{S(OFF)} | OFF-state leakage current | V _{CC} = 10.0 V; V _{EE} = 0 V; V _I = V _{IH} or V _{IL} ; V _{SW} = V _{CC} - V _{EE} ; see Fig. 9 | | | | | | | | |
| | | per channel | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| | | all channels | - | - | ±0.4 | - | ±4.0 | - | ±4.0 | µA |
| I _{S(ON)} | ON-state leakage current | V _{CC} = 10.0 V; V _{EE} = 0 V; V _I = V _{IH} or V _{IL} ; V _{SW} = V _{CC} - V _{EE} ; see Fig. 10 | - | - | ±0.4 | - | ±4.0 | - | ±4.0 | µA |

8-channel analog multiplexer/demultiplexer with latch

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---------------------|---------------------------|---|-------|-----|------|------------------|-------|-------------------|-------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| I _{CC} | supply current | V _{EE} = 0 V; V _I = V _{CC} or GND; V _{is} = V _{EE} or V _{CC} ; V _{os} = V _{CC} or V _{EE} | | | | | | | | |
| | | V _{CC} = 6.0 V | - | - | 8.0 | - | 80.0 | - | 160.0 | µA |
| | | V _{CC} = 10.0 V | - | - | 16.0 | - | 160.0 | - | 320.0 | µA |
| C _I | input capacitance | | - | 3.5 | - | - | - | - | - | pF |
| C _{sw} | switch capacitance | independent pins Yn | - | 5 | - | - | - | - | - | pF |
| | | common pins Z | - | 25 | - | - | - | - | - | pF |
| 74HCT4351 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 4.5 V to 5.5 V | 2.0 | 1.6 | - | 2.0 | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 4.5 V to 5.5 V | - | 1.2 | 0.8 | - | 0.8 | - | 0.8 | V |
| I _I | input leakage current | V _I = V _{CC} or GND; V _{CC} = 5.5 V; V _{EE} = 0 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| I _{S(OFF)} | OFF-state leakage current | V _{CC} = 10.0 V; V _{EE} = 0 V; V _I = V _{IH} or V _{IL} ; V _{SW} = V _{CC} - V _{EE} ; see Fig. 9 | | | | | | | | |
| | | per channel | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| | | all channels | - | - | ±0.4 | - | ±4.0 | - | ±4.0 | µA |
| I _{S(ON)} | ON-state leakage current | V _{CC} = 10.0 V; V _{EE} = 0 V; V _I = V _{IH} or V _{IL} ; V _{SW} = V _{CC} - V _{EE} ; see Fig. 10 | - | - | ±0.4 | - | ±4.0 | - | ±4.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; V _{is} = V _{EE} or V _{CC} ; V _{os} = V _{CC} or V _{EE} | | | | | | | | |
| | | V _{CC} = 5.5 V; V _{EE} = 0 V | - | - | 8.0 | - | 80.0 | - | 160.0 | µA |
| | | V _{CC} = 5.0 V; V _{EE} = -5.0 V | - | - | 16.0 | - | 160.0 | - | 320.0 | µA |
| ΔI _{CC} | additional supply current | per input; other inputs at V _{CC} or GND; V _I = V _{CC} - 2.1 V; V _{CC} = 4.5 V to 5.5 V; V _{EE} = 0 V | | | | | | | | |
| | | inputs $\overline{E}1$, E2 and Sn | - | 50 | 180 | - | 225 | - | 245 | µA |
| | | input \overline{LE} | - | 150 | 540 | - | 675 | - | 735 | µA |
| C _I | input capacitance | | - | 3.5 | - | - | - | - | - | pF |
| C _{sw} | switch capacitance | independent pins Yn | - | 5 | - | - | - | - | - | pF |
| | | common pins Z | - | 25 | - | - | - | - | - | pF |



11. Dynamic characteristics

Table 8. Dynamic characteristics

$GND = 0\text{ V}$; $t_r = t_f = 6\text{ ns}$; $C_L = 50\text{ pF}$; for test circuit see Fig. 14.
 V_{is} is the input voltage at pins Yn or Z, whichever is assigned as an input;
 V_{os} is the output voltage at pins Z or Yn, whichever is assigned as an output.

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------|-------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74HC4351 | | | | | | | | | | |
| t _{pd} | propagation delay | V _{is} to V _{os} ; R _L = ∞ Ω; see Fig. 11 [1] | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 14 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 5 | 12 | - | 15 | - | 18 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 4 | 10 | - | 13 | - | 15 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 4 | 8 | - | 10 | - | 12 | ns |
| t _{on} | turn-ON time | E1 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 85 | 300 | - | 375 | - | 450 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 31 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 25 | 51 | - | 64 | - | 77 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 28 | 55 | - | 69 | - | 83 | ns |
| | | E2 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 85 | 300 | - | 375 | - | 450 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 31 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 25 | 51 | - | 64 | - | 77 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 25 | 55 | - | 69 | - | 83 | ns |
| | | LE to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 91 | 300 | - | 375 | - | 450 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 33 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 26 | 51 | - | 64 | - | 77 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 27 | 55 | - | 69 | - | 83 | ns |
| | | Sn to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 88 | 300 | - | 375 | - | 450 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 32 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 26 | 51 | - | 64 | - | 77 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 25 | 50 | - | 63 | - | 75 | ns |

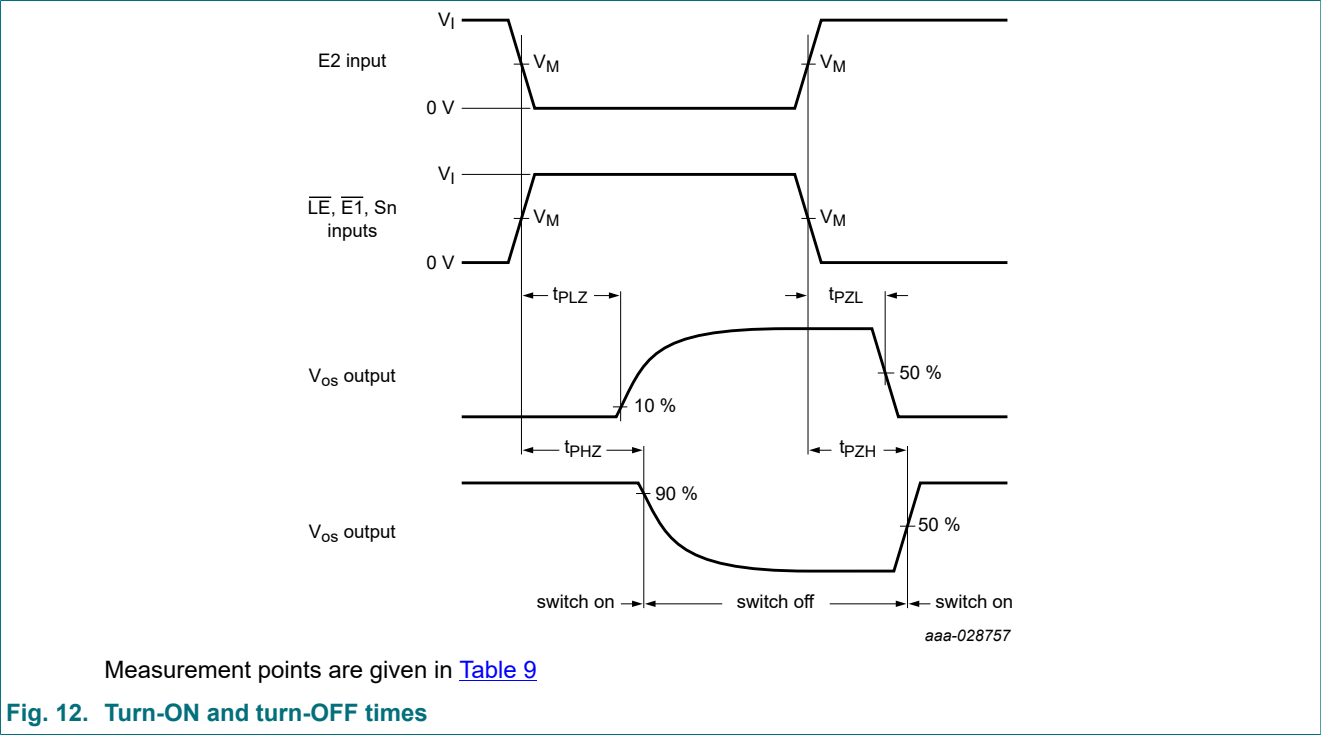
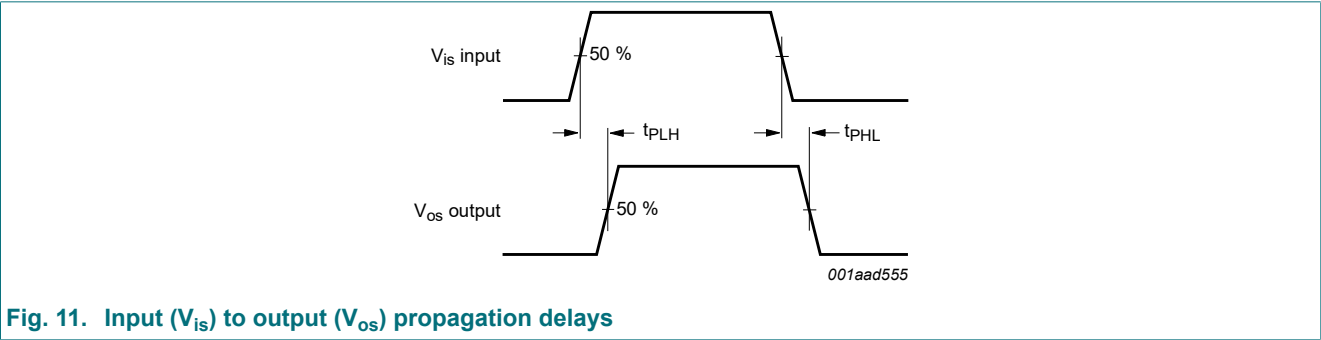
| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|----------------------|-------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| t _{off} | turn-OFF time | E1 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 69 | 250 | - | 315 | - | 375 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 25 | 50 | - | 63 | - | 75 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 20 | 43 | - | 54 | - | 64 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 20 | 40 | - | 50 | - | 60 | ns |
| | | E2 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 72 | 250 | - | 315 | - | 375 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 26 | 50 | - | 63 | - | 75 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 21 | 43 | - | 54 | - | 64 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 19 | 40 | - | 50 | - | 60 | ns |
| | | LE to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 83 | 275 | - | 345 | - | 415 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 30 | 55 | - | 69 | - | 83 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 24 | 47 | - | 59 | - | 71 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 26 | 45 | - | 56 | - | 68 | ns |
| | | Sn to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | - | 80 | 275 | - | 345 | - | 415 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 29 | 55 | - | 69 | - | 83 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | - | 23 | 47 | - | 59 | - | 71 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 24 | 48 | - | 60 | - | 72 | ns |
| t _{su} | set-up time | Sn to LE; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | 60 | 17 | - | - | 75 | - | 90 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 12 | 6 | - | - | 15 | - | 18 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | 10 | 5 | - | - | 13 | - | 15 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 18 | 9 | - | - | 23 | - | 27 | ns |
| t _{hold} | hold time | Sn to LE; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | 5 | -8 | - | - | 5 | - | 5 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 5 | -3 | - | - | 5 | - | 5 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | 5 | -2 | - | - | 5 | - | 5 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 5 | -4 | - | - | 5 | - | 5 | ns |
| t _{WH(min)} | minimum pulse width HIGH | LE; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 2.0 V; V _{EE} = 0 V | 100 | 11 | - | - | 125 | - | 150 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 20 | 1 | - | - | 25 | - | 30 | ns |
| | | V _{CC} = 6.0 V; V _{EE} = 0 V | 17 | 3 | - | - | 21 | - | 26 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 25 | 7 | - | - | 31 | - | 38 | ns |
| C _{pd} | power dissipation capacitance | per switch; V _I = GND to V _{CC} [2] | - | 25 | - | - | - | - | - | pF |
| C _{sw} | switch capacitance | maximum | | | | | | | | |
| | | independent (Yn) | - | 5 | - | - | - | - | - | pF |
| | | common (Z) | - | 25 | - | - | - | - | - | pF |

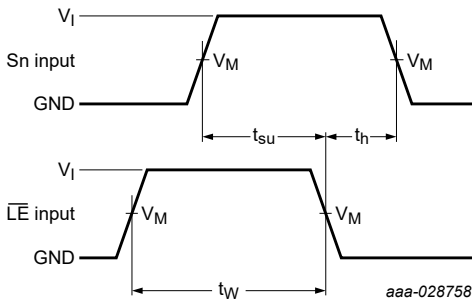
| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|----------------------|-------------------------------|--|-------|-----|-----|------------------|-----|-------------------|-----|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74HCT4351 | | | | | | | | | | |
| t _{pd} | propagation delay | V _{is} to V _{os} ; R _L = ∞ Ω; see Fig. 11 [1] | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 6 | 12 | - | 15 | - | 18 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 4 | 8 | - | 10 | - | 12 | ns |
| t _{on} | turn-ON time | $\overline{E1}$ to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 40 | 75 | - | 94 | - | 113 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 31 | 60 | - | 75 | - | 90 | ns |
| | | E2 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 35 | 70 | - | 88 | - | 105 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 26 | 50 | - | 63 | - | 75 | ns |
| | | \overline{LE} to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 42 | 75 | - | 94 | - | 113 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 37 | 60 | - | 75 | - | 90 | ns |
| | | Sn to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 39 | 75 | - | 94 | - | 113 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 30 | 60 | - | 75 | - | 90 | ns |
| t _{off} | turn-OFF time | $\overline{E1}$ to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 27 | 55 | - | 69 | - | 83 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 20 | 40 | - | 50 | - | 60 | ns |
| | | E2 to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 32 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 26 | 50 | - | 63 | - | 75 | ns |
| | | \overline{LE} to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 33 | 60 | - | 75 | - | 90 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 30 | 55 | - | 69 | - | 83 | ns |
| | | Sn to V _{os} ; R _L = 1 kΩ; see Fig. 12 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | - | 33 | 65 | - | 81 | - | 98 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | - | 29 | 55 | - | 69 | - | 83 | ns |
| t _{su} | set-up time | Sn to \overline{LE} ; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 12 | 6 | - | - | 15 | - | 18 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 14 | 7 | - | - | 18 | - | 21 | ns |
| t _{hold} | hold time | Sn to \overline{LE} ; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 5 | -1 | - | - | 5 | - | 5 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 5 | -2 | - | - | 5 | - | 5 | ns |
| t _{WH(min)} | minimum pulse width HIGH | \overline{LE} ; R _L = 1 kΩ; see Fig. 13 | | | | | | | | |
| | | V _{CC} = 4.5 V; V _{EE} = 0 V | 25 | 13 | - | - | 31 | - | 38 | ns |
| | | V _{CC} = 4.5 V; V _{EE} = -4.5 V | 25 | 13 | - | - | 31 | - | 38 | ns |
| C _{pd} | power dissipation capacitance | per switch; V _I = GND to V _{CC} - 1.5 V [2] | - | 25 | - | - | - | - | - | pF |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------|--------------------|-------------------------------|-------|-----|-----|------------------|-----|-------------------|-----|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| C _{sw} | switch capacitance | maximum | | | | | | | | |
| | | independent (Y _n) | - | 5 | - | - | - | - | - | pF |
| | | common (Z) | - | 25 | - | - | - | - | - | pF |

- [1] t_{pd} is the same as t_{PHL} and t_{PLH} .
- [2] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$ where:
 f_i = input frequency in MHz;
 f_o = output frequency in MHz;
 N = number of inputs switching;
 $\Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$ = sum of outputs;
 C_L = output load capacitance in pF;
 C_{sw} = switch capacitance in pF;
 V_{CC} = supply voltage in V.

11.1. Waveforms and test circuit



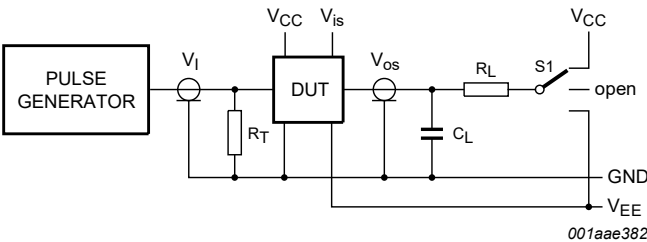
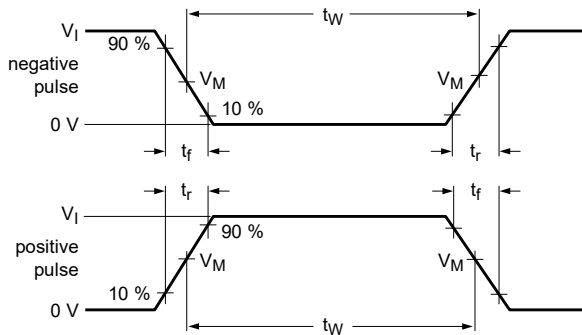


Measurement points are given in [Table 9](#)

Fig. 13. Set-up and hold times from Sn inputs to LE input, and minimum pulse width of LE.

Table 9. Measurement points

| Type | Input | | Output |
|-----------|------------------------|-----------------------|-----------------------|
| | V _I | V _M | V _M |
| 74HC4351 | GND to V _{CC} | 0.5 × V _{CC} | 0.5 × V _{CC} |
| 74HCT4351 | GND to 3 V | 1.3 V | 1.3 V |



Test data is given in [Table 10](#):

Definitions test circuit:

R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator;

C_L = Load capacitance including jig and probe capacitance;

R_L = Load resistance;

S1 = Test selection switch.

Fig. 14. Test circuit for measuring switching times

Table 10. Test data

| Test | Input | | | | Load | | S1 position |
|-------------------------------------|----------------|-----------------|---------------------------------|-----------|----------------|----------------|-----------------|
| | V _I | V _{is} | t _r , t _f | | C _L | R _L | |
| | | | at f _{max} | other [1] | | | |
| t _{PZH} , t _{PHZ} | [2] | V _{CC} | < 2 ns | 6 ns | 50 pF | 1 kΩ | V _{EE} |
| t _{PZL} , t _{PLZ} | [2] | V _{EE} | < 2 ns | 6 ns | 50 pF | 1 kΩ | V _{CC} |
| Other | [2] | pulse | < 2 ns | 6 ns | 50 pF | 1 kΩ | open |

[1] t_r = t_f = 6 ns; when measuring f_{max}, there is no constraint to t_r and t_f with 50 % duty factor.

[2] V_I values:
For 74HC4351: V_I = V_{CC}
For 74HCT4351: V_I = 3 V

11.2. Additional dynamic characteristics

Table 11. Additional dynamic characteristics

Recommended conditions and typical values; $GND = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 50\text{ pF}$ unless stated otherwise.
 V_{is} is the input voltage at pins Y_n or Z , whichever is assigned as an input.
 V_{os} is the output voltage at pins Y_n or Z , whichever is assigned as an output.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--------------------------|---|-----|------|-----|------|
| d_{sin} | sine-wave distortion | $f_i = 1\text{ kHz}$; $R_L = 10\text{ k}\Omega$; see Fig. 15 | | | | |
| | | $V_{is} = 4.0\text{ V (p-p)}$; $V_{CC} = 2.25\text{ V}$; $V_{EE} = -2.25\text{ V}$ | - | 0.04 | - | % |
| | | $V_{is} = 8.0\text{ V (p-p)}$; $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ | - | 0.02 | - | % |
| | | $f_i = 10\text{ kHz}$; $R_L = 10\text{ k}\Omega$; see Fig. 15 | | | | |
| | | $V_{is} = 4.0\text{ V (p-p)}$; $V_{CC} = 2.25\text{ V}$; $V_{EE} = -2.25\text{ V}$ | - | 0.12 | - | % |
| | | $V_{is} = 8.0\text{ V (p-p)}$; $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ | - | 0.06 | - | % |
| α_{iso} | isolation (OFF-state) | $R_L = 600\text{ }\Omega$; $f_i = 1\text{ MHz}$; see Fig. 16 | | | | |
| | | $V_{CC} = 2.25\text{ V}$; $V_{EE} = -2.25\text{ V}$ [1] | - | -50 | - | dB |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ [1] | - | -50 | - | dB |
| V_{ct} | crosstalk voltage | between control and any switch (peak-to-peak value); $R_L = 600\text{ }\Omega$; $f_i = 1\text{ MHz}$; $\overline{E1}$, $E2$ or Sn square wave between V_{CC} and GND ; $t_r = t_f = 6\text{ ns}$; see Fig. 17 | | | | |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = 0\text{ V}$ | - | 120 | - | mV |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ | - | 220 | - | mV |
| $f_{(-3dB)}$ | -3 dB frequency response | $R_L = 50\text{ }\Omega$; $C_L = 10\text{ pF}$ see Fig. 18 | | | | |
| | | $V_{CC} = 2.25\text{ V}$; $V_{EE} = -2.25\text{ V}$ [2] | - | 160 | - | MHz |
| | | $V_{CC} = 4.5\text{ V}$; $V_{EE} = -4.5\text{ V}$ [2] | - | 170 | - | MHz |

- [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).

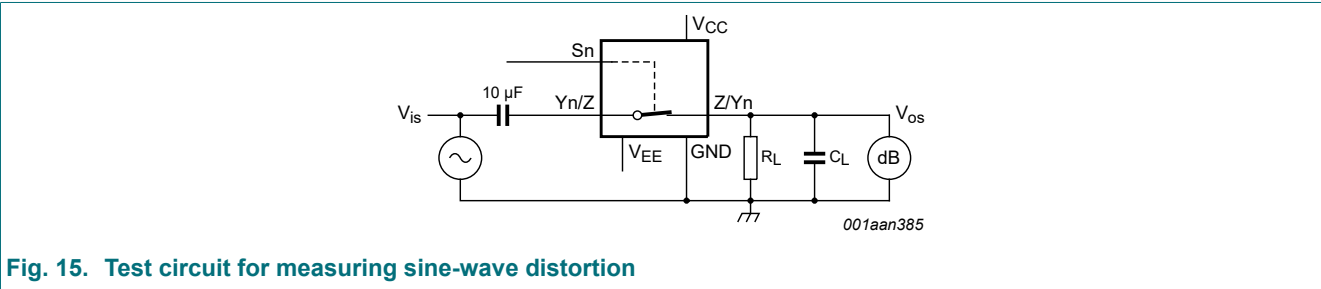
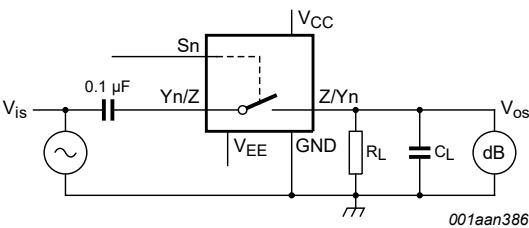
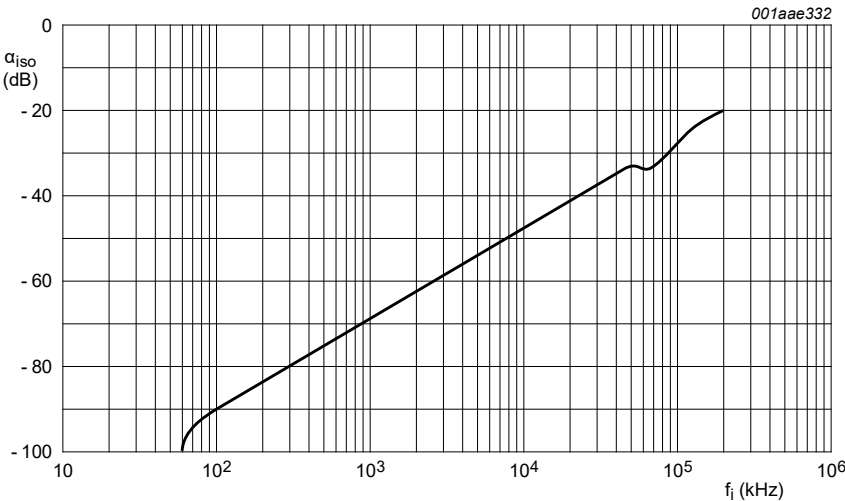


Fig. 15. Test circuit for measuring sine-wave distortion



$V_{CC} = 4.5\text{ V}$; $GND = 0\text{ V}$; $V_{EE} = -4.5\text{ V}$; $R_L = 600\text{ }\Omega$; $R_S = 1\text{ k}\Omega$

a. Test circuit



b. Isolation (OFF-state) as a function of frequency

Fig. 16. Test circuit for measuring isolation (OFF-state)

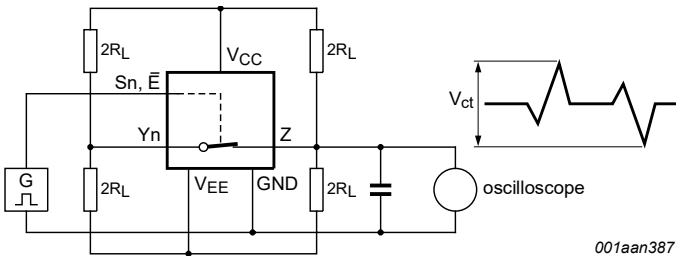
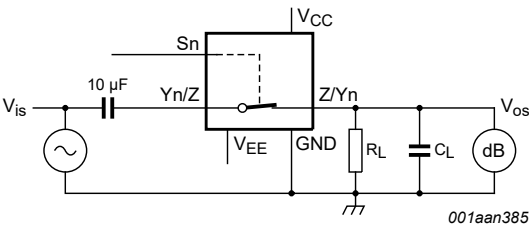
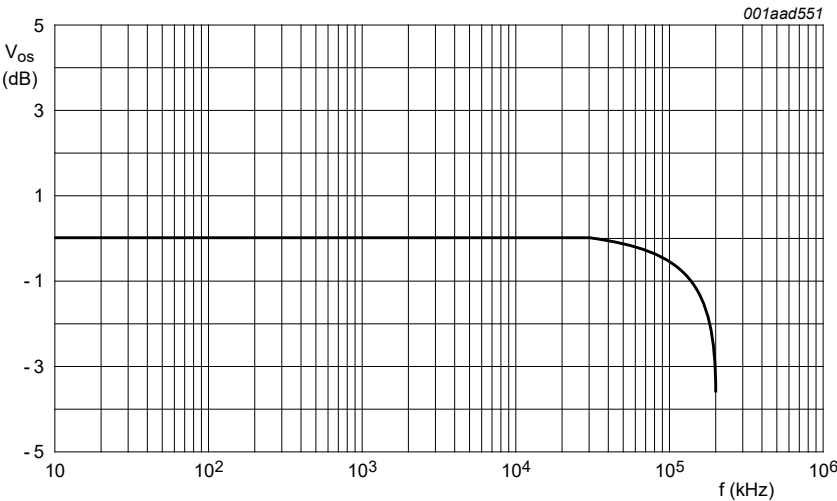


Fig. 17. Test circuit for measuring crosstalk between control input and any switch



$V_{CC} = 4.5\text{ V}$; $GND = 0\text{ V}$; $V_{EE} = -4.5\text{ V}$; $R_L = 50\text{ }\Omega$; $R_S = 1\text{ k}\Omega$

a. Test circuit



b. Typical frequency response

Fig. 18. Test circuit for frequency response

12. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



Fig. 19. Package outline SOT163-1 (SO20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1



Fig. 20. Package outline SOT360-1 (TSSOP20)

13. Abbreviations

Table 12. Abbreviations

| Acronym | Description |
|---------|---|
| ANSI | American National Standards Institute |
| CDM | Charged Device Model |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| ESDA | ElectroStatic Discharge Association |
| HBM | Human Body Model |
| JEDEC | Joint Electron Device Engineering Council |

14. Revision history

Table 13. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|---|-----------------------|---------------|------------------|
| 74HC_HCT4351 v.6 | 20240725 | Product data sheet | - | 74HC_HCT4351 v.5 |
| Modifications: | <ul style="list-style-type: none">Section 2: ESD specification updated according to the latest JEDEC standard. | | | |
| 74HC_HCT4351 v.5 | 20231102 | Product data sheet | - | 74HC_HCT4351 v.4 |
| Modifications: | <ul style="list-style-type: none">Type number 74HC4351DB (SOT339-1/SSOP20) removed. | | | |
| 74HC_HCT4351 v.4 | 20210804 | Product data sheet | - | 74HC_HCT4351 v.3 |
| Modifications: | <ul style="list-style-type: none">Type number 74HC4351PW (SOT360-1/TSSOP20) added.Type number 74HCT4351DB (SOT339-1/SSOP20) removed.Section 8: Derating values for P_{tot} total power dissipation updated. | | | |
| 74HC_HCT4351 v.3 | 20180709 | Product data sheet | - | 74HC_HCT4351 v.2 |
| Modifications: | <ul style="list-style-type: none">The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.Legal texts have been adapted to the new company name where appropriate.Type numbers 74HC4351N (SOT146-1) and 74HCT4351N (SOT146-1) removed. | | | |
| 74HC_HCT4351 v.2 | 19901201 | Product specification | - | 74HC_HCT4351 v.1 |

15. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 25 July 2024

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