# 74HC4851; 74HCT4851

## 8-channel analog multiplexer/demultiplexer with injection-current effect control

Rev. 5 — 30 May 2024 Product data sheet

## 1. General description

The 74HC4851; 74HCT4851 are high-speed Si-gate CMOS devices and are specified in compliance with JEDEC standard no. 7A.

The 74HC4851; 74HCT4851 are 8-channel analog multiplexers/demultiplexers with three digital select inputs (S0 to S2), an active-LOW enable input ($\overline{E}$), eight independent inputs/outputs (Y0 to Y7) and a common input/output (Z). The devices feature injection-current effect control, which has excellent value in automotive applications where voltages in excess of the supply voltage are common.

With $\overline{E}$ LOW, one of the eight switches is selected (low impedance ON-state) by S0 to S2.
With $\overline{E}$ HIGH, all switches are in the high-impedance OFF-state, independent of S0 to S2.

The injection-current effect control allows signals at disabled analog input channels to exceed the supply voltage without affecting the signal of the enabled analog channel. This eliminates the need for external diode/resistor networks typically used to keep the analog channel signals within the supply-voltage range.

## 2. Features and benefits

- Injection-current cross coupling < 1 mV/mA
- Wide supply voltage range from 2.0 V to 6.0 V for 74HC4851
- Latch-up performance exceeds 100 mA per JESD 78 Class II level A
- Low ON-state resistance:
  - 400 Ω (typical) at $V_{CC}$ = 2.0 V
  - 215 Ω (typical) at $V_{CC}$ = 3.0 V
  - 120 Ω (typical) at $V_{CC}$ = 3.3 V
  - 76 Ω (typical) at $V_{CC}$ = 4.5 V
  - 59 Ω (typical) at $V_{CC}$ = 6.0 V
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- 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

nexperia

# 4. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC4851D<br>74HCT4851D | -40 °C to +125 °C | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |
| 74HC4851PW<br>74HCT4851PW | -40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HC4851BQ<br>74HCT4851BQ | -40 °C to +125 °C | DHVQFN16 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm | SOT763-1 |

# 5. Functional diagram

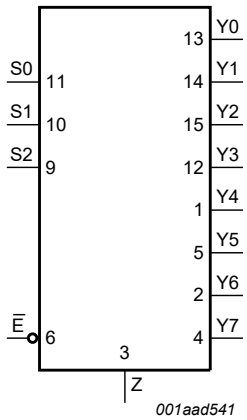



**Fig. 1. Logic symbol**

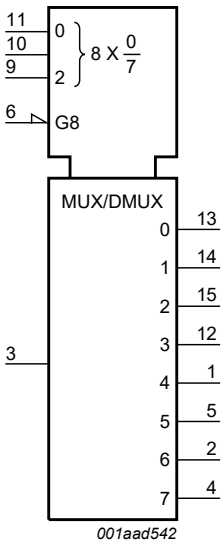



**Fig. 2. IEC logic symbol**

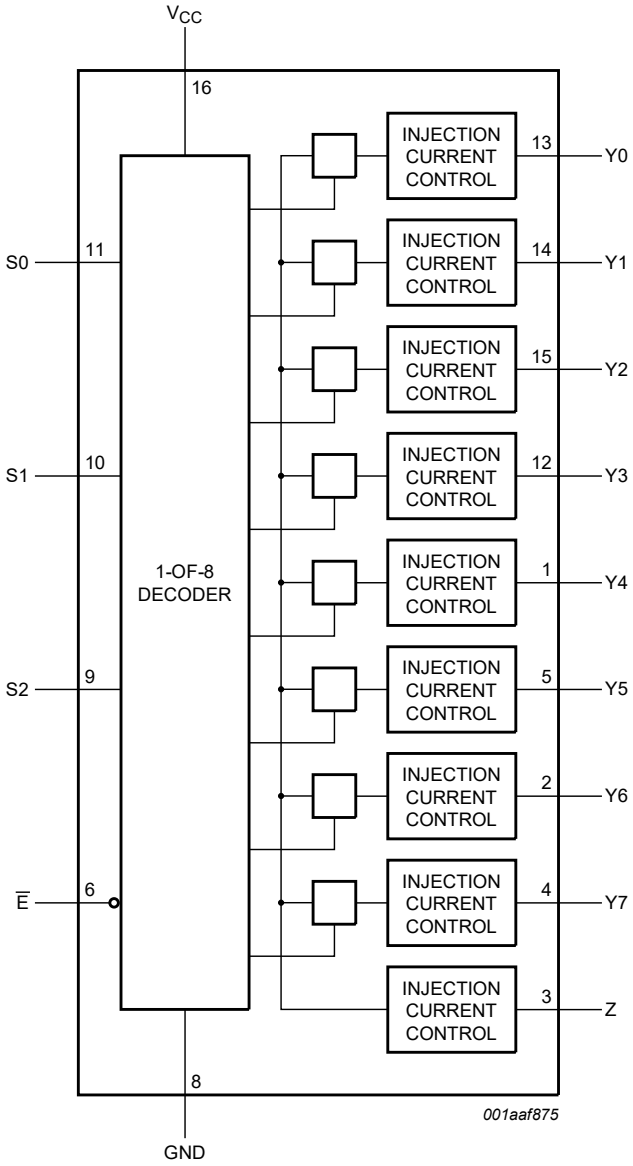
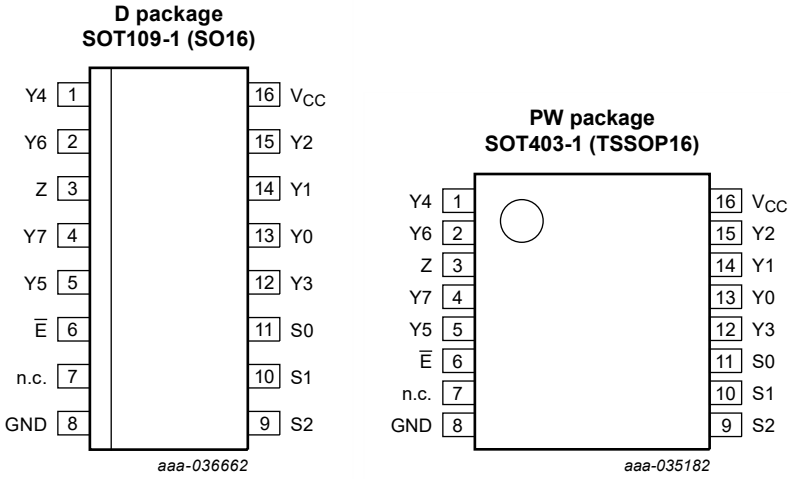
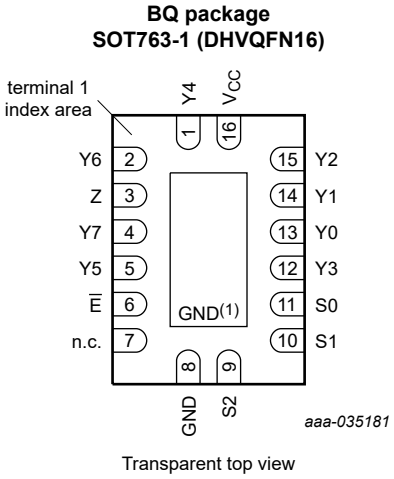



**Fig. 3. Functional diagram**

# 6. Pinning information

## 6.1. Pinning




Transparent top view

(1) This is not a ground pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to GND.

## 6.2. Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| Y4, Y6, Y7, Y5, Y3, Y0, Y1, Y2 | 1, 2, 4, 5, 12, 13, 14, 15 | independent input/output |
| Z | 3 | common input/output |
| $\overline{E}$ | 6 | enable input (active LOW) |
| n.c. | 7 | not connected |
| GND | 8 | ground (0 V) |
| S2, S1, S0 | 9, 10, 11 | select input |
| $V_{CC}$ | 16 | supply voltage |

# 7. Functional description

**Table 3. Function table**

*H = HIGH voltage level; L = LOW voltage level; X = don't care.*

| Input | | | | Channel ON |
|---|---|---|---|---|
| $\overline{E}$ | S2 | S1 | S0 | |
| L | L | L | L | Y0 to Z |
| L | L | L | H | Y1 to Z |
| L | L | H | L | Y2 to Z |
| L | L | H | H | Y3 to Z |
| L | H | L | L | Y4 to Z |
| L | H | L | H | Y5 to Z |
| L | H | H | L | Y6 to Z |
| L | H | H | H | Y7 to Z |
| H | X | X | X | - |

# 8. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | -0.5 | +7.0 | V |
| $V_I$ | input voltage | [1] | -0.5 | $V_{CC}$ + 0.5 | V |
| $V_{SW}$ | switch voltage | [2] | -0.5 | $V_{CC}$ + 0.5 | 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 | $V_{SW}$ > -0.5 V or $V_{SW}$ < $V_{CC}$ + 0.5 V | - | ±25 | 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 [3] | - | 500 | mW |

[1] The minimum and maximum input voltage rating may be exceeded if the input clamping current rating is observed.
[2] The minimum and maximum switch voltage rating may be exceeded if the switch clamping current rating is observed.
[3] For SOT109-1 (SO16) package: $P_{tot}$ derates linearly with 12.4 mW/K above 110 °C.
For SOT403-1 (TSSOP16) package: $P_{tot}$ derates linearly with 8.5 mW/K above 91 °C.
For SOT763-1 (DHVQFN16) package: $P_{tot}$ derates linearly with 11.2 mW/K above 106 °C.

# 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol | Parameter | Conditions | 74HC4851 | | | 74HCT4851 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $V_{CC}$ | supply voltage | | 2.0 | - | 6.0 | 4.5 | 5.0 | 5.5 | V |
| $V_I$ | input voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $V_{SW}$ | switch voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | -40 | - | +125 | -40 | - | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC}$ = 2.0 V | - | 6.0 | 1000 | - | - | - | ns/V |
| | | $V_{CC}$ = 3.0 V | - | 6.0 | 800 | - | - | - | ns/V |
| | | $V_{CC}$ = 3.3 V | - | 6.0 | 800 | - | - | - | ns/V |
| | | $V_{CC}$ = 4.5 V | - | 6.0 | 500 | - | 6.0 | 500 | ns/V |
| | | $V_{CC}$ = 6.0 V | - | 6.0 | 400 | - | - | - | ns/V |

# 10. Static characteristics

**Table 6. $R_{ON}$ resistance**

*At recommended operating conditions; voltages are referenced to GND (ground 0 V); For test circuit see Fig. 6.*

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC4851** | | | | | | | | | | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I$ = $V_{CC}$ to GND; $\overline{E}$ = $V_{IL}$ | | | | | | | | |
| | | $V_{CC}$ = 2.0 V; $I_{SW}$ = 2 mA | - | 400 | 650 | - | 670 | - | 700 | Ω |
| | | $V_{CC}$ = 3.0 V; $I_{SW}$ ≤ 2 mA | - | 215 | 330 | - | 360 | - | 380 | Ω |
| | | $V_{CC}$ = 3.3 V; $I_{SW}$ ≤ 2 mA | - | 120 | 270 | - | 305 | - | 345 | Ω |
| | | $V_{CC}$ = 4.5 V; $I_{SW}$ ≤ 2 mA | - | 76 | 210 | - | 240 | - | 270 | Ω |
| | | $V_{CC}$ = 6.0 V; $I_{SW}$ ≤ 2 mA | - | 59 | 195 | - | 220 | - | 250 | Ω |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I$ = 0.5 × $V_{CC}$; $\overline{E}$ = $V_{IL}$ | | | | | | | | |
| | | $V_{CC}$ = 2.0 V; $I_{SW}$ = 2 mA | - | 4 | 10 | - | 15 | - | 20 | Ω |
| | | $V_{CC}$ = 3.0 V; $I_{SW}$ ≤ 2 mA | - | 2 | 8 | - | 12 | - | 16 | Ω |
| | | $V_{CC}$ = 3.3 V; $I_{SW}$ ≤ 2 mA | - | 2 | 8 | - | 12 | - | 16 | Ω |
| | | $V_{CC}$ = 4.5 V; $I_{SW}$ ≤ 2 mA | - | 2 | 8 | - | 12 | - | 16 | Ω |
| | | $V_{CC}$ = 6.0 V; $I_{SW}$ ≤ 2 mA | - | 3 | 9 | - | 13 | - | 18 | Ω |
| **74HCT4851** | | | | | | | | | | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I$ = $V_{CC}$ to GND; $\overline{E}$ = $V_{IL}$ | | | | | | | | |
| | | $V_{CC}$ = 4.5 V; $I_{SW}$ ≤ 2 mA | - | 76 | 210 | - | 240 | - | 270 | Ω |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I$ = 0.5 × $V_{CC}$; $\overline{E}$ = $V_{IL}$ | | | | | | | | |
| | | $V_{CC}$ = 4.5 V; $I_{SW}$ ≤ 2 mA | - | 2 | 8 | - | 12 | - | 16 | Ω |

**Table 7. Injection current coupling**

*At recommended operating conditions; voltages are referenced to GND (ground 0 V); For test circuit see Fig. 7.*

| Symbol | Parameter | Conditions | 74HC4851 | | | 74HCT4851 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ [1] | Max | Min | Typ [1] | Max | |
| **$T_{amb}$ = -40 °C to +125 °C** | | | | | | | | | |
| $\Delta V_O$ | output voltage variation | $\|I_{SW}\| \leq 1$ mA; $R_S \leq 3.9$ kΩ [2] [3] | | | | | | | |
| | | $V_{CC}$ = 3.3 V | - | 0.05 | 1 | - | - | - | mV |
| | | $V_{CC}$ = 5.0 V | - | 0.03 | 1 | - | 0.03 | 1 | mV |
| | | $\|I_{SW}\| \leq 10$ mA; $R_S \leq 3.9$ kΩ | | | | | | | |
| | | $V_{CC}$ = 3.3 V | - | 0.55 | 5 | - | - | - | mV |
| | | $V_{CC}$ = 5.0 V | - | 0.27 | 5 | - | 0.27 | 5 | mV |
| | | $\|I_{SW}\| \leq 1$ mA; $R_S \leq 20$ kΩ | | | | | | | |
| | | $V_{CC}$ = 3.3 V | - | 0.04 | 2 | - | - | - | mV |
| | | $V_{CC}$ = 5.0 V | - | 0.03 | 2 | - | 0.03 | 2 | mV |
| | | $\|I_{SW}\| \leq 10$ mA; $R_S \leq 20$ kΩ | | | | | | | |
| | | $V_{CC}$ = 3.3 V | - | 0.56 | 20 | - | - | - | mV |
| | | $V_{CC}$ = 5.0 V | - | 0.48 | 20 | - | 0.48 | 20 | mV |

[1] Typical values are measured at $T_{amb}$ = 25 °C.
[2] $\Delta V_O$ here is the maximum variation of output voltage of an enabled analog channel when current is injected into any disabled channel.
[3] $I_{SW}$ = total current injected into all disabled channels.

**Table 8. Static characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground 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 | |
| **74HC4851** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | control inputs | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
| | | $V_{CC}$ = 3.0 V | 2.1 | - | - | 2.1 | - | 2.1 | - | V |
| | | $V_{CC}$ = 3.3 V | 2.3 | - | - | 2.3 | - | 2.3 | - | V |
| | | $V_{CC}$ = 4.5 V | 3.15 | - | - | 3.15 | - | 3.15 | - | V |
| | | $V_{CC}$ = 6.0 V | 4.2 | - | - | 4.2 | - | 4.2 | - | V |
| $V_{IL}$ | LOW-level input voltage | control inputs | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| | | $V_{CC}$ = 3.0 V | - | - | 0.9 | - | 0.9 | - | 0.9 | V |
| | | $V_{CC}$ = 3.3 V | - | - | 1.0 | - | 1.0 | - | 1.0 | V |
| | | $V_{CC}$ = 4.5 V | - | - | 1.35 | - | 1.35 | - | 1.35 | V |
| | | $V_{CC}$ = 6.0 V | - | - | 1.8 | - | 1.8 | - | 1.8 | V |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $I_I$ | input leakage current | control inputs; $V_I$ = GND or $V_{CC}$; $V_{CC}$ = 6.0 V | - | - | ±0.1 | - | ±0.1 | - | ±1.0 | µA |
| $I_{S(OFF)}$ | OFF-state leakage current | $\overline{E}$ = $V_{IH}$; $V_I$ = GND or $V_{CC}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V; see Fig. 4 | | | | | | | | |
| | | per channel | - | - | ±0.1 | - | ±0.5 | - | ±1.0 | µA |
| | | all channels | - | - | ±0.2 | - | ±2.0 | - | ±4.0 | µA |
| $I_{S(ON)}$ | ON-state leakage current | $\overline{E}$ = $V_{IL}$; $V_I$ = GND or $V_{CC}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V; see Fig. 5 | - | - | ±0.1 | - | ±0.5 | - | ±1.0 | µA |
| $I_{CC}$ | supply current | $V_I$ = GND or $V_{CC}$; $V_{CC}$ = 6.0 V | - | - | 2.0 | - | 5.0 | - | 20.0 | µA |
| $C_I$ | input capacitance | S0, S1, S2 and $\overline{E}$ | - | 2 | 10 | - | 10 | - | 10 | pF |
| $C_{sw}$ | switch capacitance | Z; OFF-state | - | 15 | 40 | - | 40 | - | 40 | pF |
| | | Yn; OFF-state | - | 3 | 15 | - | 15 | - | 15 | pF |
| **74HCT4851** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | control inputs; $V_{CC}$ = 4.5 V to 5.5 V | 2.0 | - | - | 2.0 | - | 2.0 | - | V |
| $V_{IL}$ | LOW-level input voltage | control inputs; $V_{CC}$ = 4.5 V to 5.5 V | - | - | 0.8 | - | 0.8 | - | 0.8 | V |
| $I_I$ | input leakage current | control inputs; $V_I$ = GND or $V_{CC}$; $V_{CC}$ = 5.5 V | - | - | ±0.1 | - | ±0.1 | - | ±1.0 | µA |
| $I_{S(OFF)}$ | OFF-state leakage current | $\overline{E}$ = $V_{IH}$; $V_I$ = GND or $V_{CC}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V; see Fig. 4 | | | | | | | | |
| | | per channel | - | - | ±0.1 | - | ±0.5 | - | ±1.0 | µA |
| | | all channels | - | - | ±0.2 | - | ±2.0 | - | ±4.0 | µA |
| $I_{S(ON)}$ | ON-state leakage current | $\overline{E}$ = $V_{IL}$; $V_I$ = GND or $V_{CC}$; $V_O$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V; see Fig. 5 | - | - | ±0.1 | - | ±0.5 | - | ±1.0 | µA |
| $I_{CC}$ | supply current | $V_I$ = GND or $V_{CC}$; $V_{CC}$ = 5.5 V | - | - | 2.0 | - | 5.0 | - | 20.0 | µA |
| $\Delta I_{CC}$ | additional supply current | control inputs; $V_I$ = $V_{CC}$ - 2.1 V; other inputs at $V_{CC}$ or GND; $V_{CC}$ = 4.5 V to 5.5 V; $I_O$ = 0 A | - | - | 300 | - | 370 | - | 370 | µA |
| $C_I$ | input capacitance | S0, S1, S2 and $\overline{E}$ | - | 2 | 10 | - | 10 | - | 10 | pF |
| $C_{sw}$ | switch capacitance | Z; OFF-state | - | 15 | 40 | - | 40 | - | 40 | pF |
| | | Yn; OFF-state | - | 3 | 15 | - | 15 | - | 15 | pF |

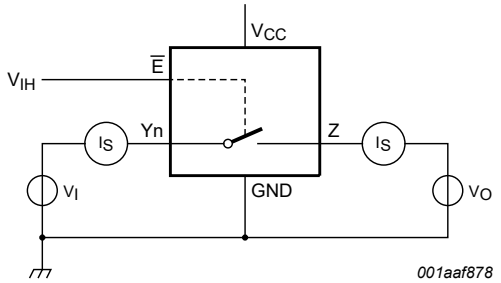
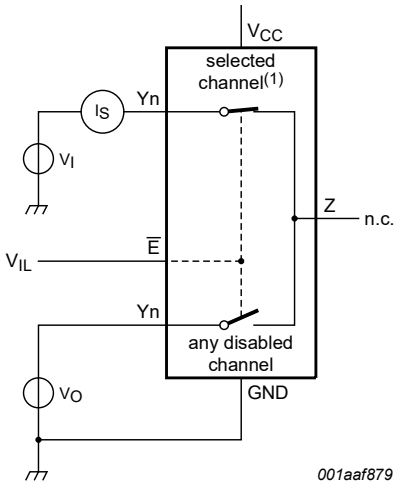
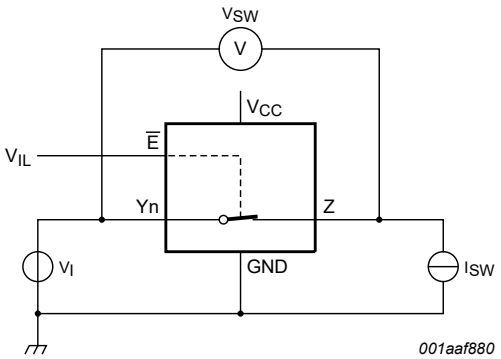



Fig. 4. Test circuit for measuring OFF-state leakage current



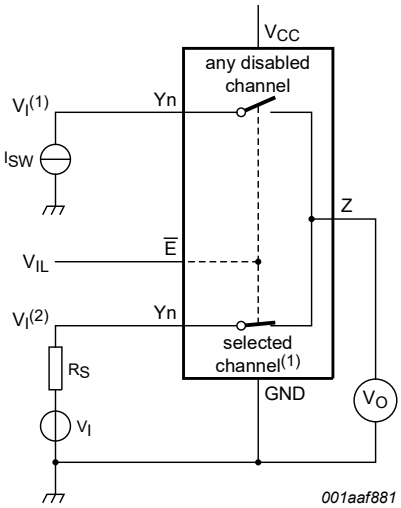

(1) Channel is selected by S0, S1 and S2.

Fig. 5. Test circuit for measuring ON-state leakage current




$R_{ON} = V_{SW} / I_{SW}$.

Fig. 6. Test circuit for measuring ON resistance




(1) Channel is selected by S0, S1 and S2.
$V_I(1) < GND$ or $V_I(1) > V_{CC}$.
$GND < V_I(2) < V_{CC}$.

Fig. 7. Test circuit for injection current coupling

# 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground 0 V); for test circuit see Fig. 12.*

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC4851** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | Z to Yn, Yn to Z; see Fig. 8 [1] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 10.0 | 25 | - | 29 | - | 32 | ns |
| | | $V_{CC}$ = 3.0 V | - | 6.0 | 15.5 | - | 17.5 | - | 19.5 | ns |
| | | $V_{CC}$ = 3.3 V | - | 5.0 | 14.5 | - | 16.5 | - | 18.5 | ns |
| | | $V_{CC}$ = 4.5 V | - | 4.0 | 11.5 | - | 12.5 | - | 13.5 | ns |
| | | $V_{CC}$ = 6.0 V | - | 3.0 | 10 | - | 11 | - | 12 | ns |
| | | Sn to Z, Sn to Yn; see Fig. 9 [1] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 18.0 | 32 | - | 35 | - | 40 | ns |
| | | $V_{CC}$ = 3.0 V | - | 9.5 | 17.5 | - | 20 | - | 23 | ns |
| | | $V_{CC}$ = 3.3 V | - | 8.5 | 16.5 | - | 19 | - | 22 | ns |
| | | $V_{CC}$ = 4.5 V | - | 6.5 | 13 | - | 15 | - | 17 | ns |
| | | $V_{CC}$ = 6.0 V | - | 5.0 | 12.5 | - | 14.5 | - | 16.5 | ns |
| $t_{en}$ | enable time | $\overline{E}$ to Z, $\overline{E}$ to Yn; see Fig. 10 [2] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 95 | - | 105 | - | 115 | ns |
| | | $V_{CC}$ = 3.0 V | - | - | 90 | - | 100 | - | 110 | ns |
| | | $V_{CC}$ = 3.3 V | - | - | 85 | - | 95 | - | 105 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 80 | - | 90 | - | 100 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 78 | - | 80 | - | 80 | ns |
| $t_{dis}$ | disable time | $\overline{E}$ to Z, $\overline{E}$ to Yn; see Fig. 10 [3] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | - | 99 | - | 105 | - | 115 | ns |
| | | $V_{CC}$ = 3.0 V | - | - | 90 | - | 100 | - | 110 | ns |
| | | $V_{CC}$ = 3.3 V | - | - | 85 | - | 95 | - | 105 | ns |
| | | $V_{CC}$ = 4.5 V | - | - | 80 | - | 90 | - | 100 | ns |
| | | $V_{CC}$ = 6.0 V | - | - | 78 | - | 80 | - | 80 | ns |
| $C_{PD}$ | power dissipation capacitance | per channel; see Fig. 11 [4] | | | | | | | | |
| | | $V_{CC}$ = 3.3 V | - | 28 | - | - | - | - | - | pF |
| | | $V_{CC}$ = 5.0 V | - | 33 | - | - | - | - | - | pF |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HCT4851** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | Z to Yn, Yn to Z; see Fig. 8 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 1.6 | 3.7 | 11.5 | 1.1 | 12.5 | 1.1 | 13.5 | ns |
| | | Sn to Z, Sn to Yn; see Fig. 9 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 3.2 | 8.0 | 13 | 2.3 | 15 | 2.3 | 17 | ns |
| $t_{en}$ | enable time | $\overline{E}$ to Z, $\overline{E}$ to Yn; see Fig. 10 [2] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 4.2 | 8.6 | 25 | 3.0 | 30 | 3.0 | 35 | ns |
| $t_{dis}$ | disable time | $\overline{E}$ to Z, $\overline{E}$ to Yn; see Fig. 10 [3] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | 28.5 | 64.7 | 80 | 28.2 | 90 | 28 | 100 | ns |
| $C_{PD}$ | power dissipation capacitance | per channel; see Fig. 11 [4] | | | | | | | | |
| | | $V_{CC}$ = 5.0 V | - | 30 | - | - | - | - | - | pF |

[1] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.
[2] $t_{en}$ is the same as $t_{PZH}$ and $t_{PZL}$.
[3] $t_{dis}$ is the same as $t_{PLZ}$ and $t_{PHZ}$.
[4] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW):
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$ where:
$f_i$ = input frequency in MHz;
$f_o$ = output frequency in MHz;
$\sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$ = 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

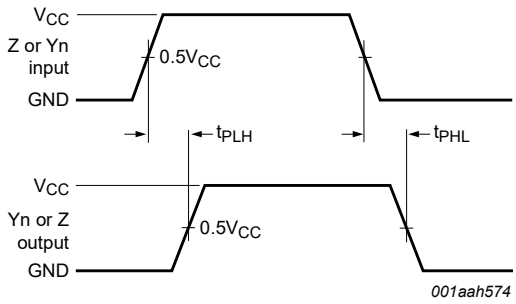
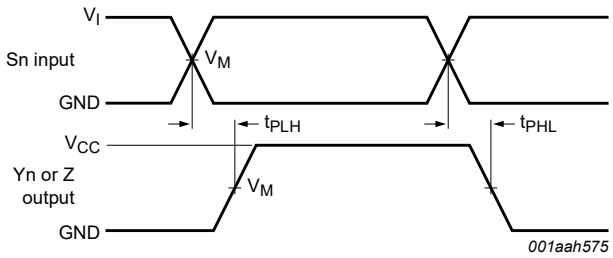
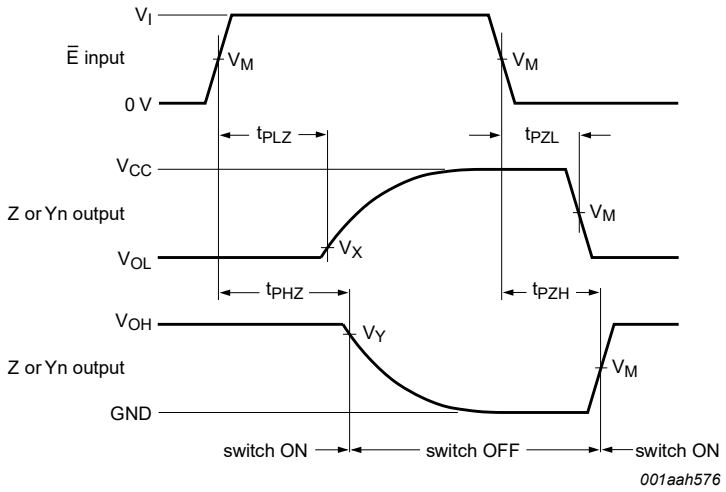



**Fig. 8. Input (Z, Yn) to output (Yn, Z) propagation delays**




Measurement points are given in Table 10.

**Fig. 9. Input (Sn) to output (Yn, Z) propagation delays**




Measurement points are given in Table 10.

Logic levels: $V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

**Fig. 10. Enable and disable times**

**Table 10. Measurement points**

| Type | Input | | Output | | |
|---|---|---|---|---|---|
| | $V_M$ | $V_I$ | $V_M$ | $V_X$ | $V_Y$ |
| 74HC4851 | 0.5 × $V_{CC}$ | $V_{CC}$ | 0.5 × $V_{CC}$ | $V_{OL}$ + 0.1 × ($V_{CC}$ - $V_{OL}$) | 0.9 × $V_{OH}$ |
| 74HCT4851 | 1.3 V | 3.0 V | 0.5 × $V_{CC}$ | $V_{OL}$ + 0.1 × ($V_{CC}$ - $V_{OL}$) | 0.9 × $V_{OH}$ |

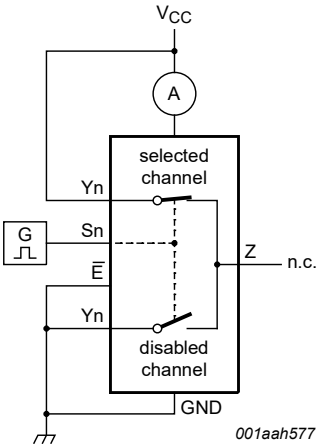
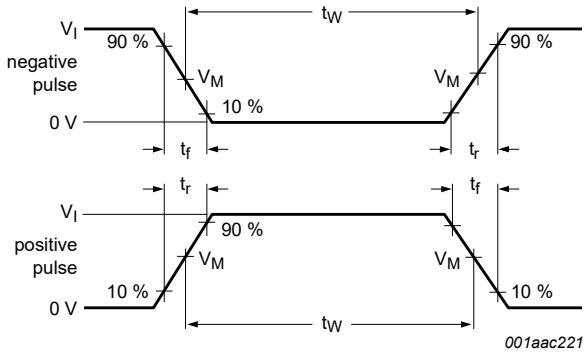
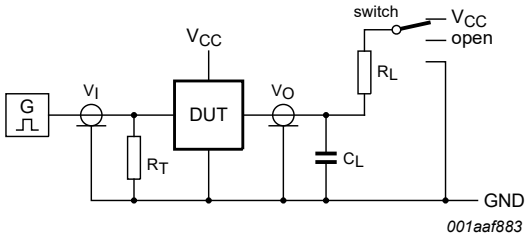



**Fig. 11. Test circuit for measuring power dissipation capacitance**




a. Input pulse definition




Test data is given in Table 11.

Definitions for test circuit:

$R_L$ = load resistance;

$C_L$ = load capacitance including jig and probe capacitance;

$R_T$ = termination resistance should be equal to the output impedance $Z_o$ of the pulse generator

b. Test circuit

**Fig. 12. Test circuit for measuring switching times**

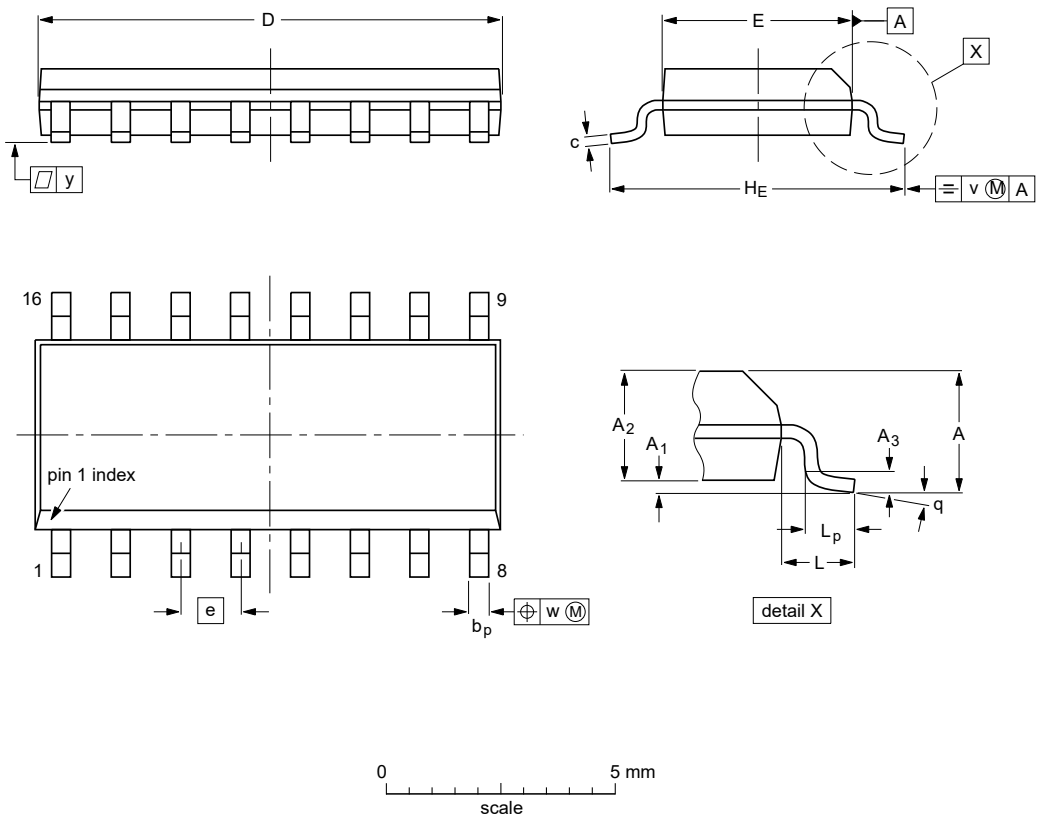
**Table 11. Test data**

| Test | Input | | | Output | | S1 position |
|---|---|---|---|---|---|---|
| | Control $\overline{E}$, Sn | Switch Yn (Z) | $t_r$, $t_f$ | Switch Z (Yn) | | |
| | $V_I$ [1] | $V_I$ | | $C_L$ | $R_L$ | |
| $t_{PHL}$, $t_{PLH}$ | $V_{CC}$ | $V_{CC}$ | 6 ns | 50 pF | - | open |
| $t_{PHZ}$, $t_{PZH}$ | $V_{CC}$ | $V_{CC}$ | 6 ns | 50 pF | 10 kΩ | GND |
| $t_{PLZ}$, $t_{PZL}$ | $V_{CC}$ | $V_{CC}$ | 6 ns | 50 pF | 10 kΩ | $V_{CC}$ |
| $C_{PD}$ | $V_{CC}$ | $V_{CC}$ | 6 ns | 0 pF | - | open |

[1] For 74HCT4851: input voltage $V_I$ = 3.0 V.

## 12. Package outline

**SO16: plastic small outline package; 16 leads; body width 3.9 mm** **SOT109-1**




Dimensions (inch dimensions are derived from the original mm dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.75 | 0.25 | | | 0.51 | 0.25 | 10.0 | 4.0 | | 6.2 | | 1.27 | | | | 8° |
| | nom | | | | 0.25 | | | | | 1.27 | | 1.05 | | 0.2 | 0.25 | 0.1 | |
| | min | | 0.10 | 1.25 | | 0.31 | 0.10 | 9.8 | 3.8 | | 5.8 | | 0.4 | | | | 0° |
| inches | max | 0.069 | 0.010 | | | 0.020 | 0.010 | 0.394 | 0.16 | | 0.244 | | 0.05 | | | | 8° |
| | nom | | | | 0.01 | | | | | 0.05 | | 0.041 | | 0.008 | 0.01 | 0.004 | |
| | min | | 0.004 | 0.049 | | 0.012 | 0.004 | 0.386 | 0.15 | | 0.228 | | 0.016 | | | | 0° |

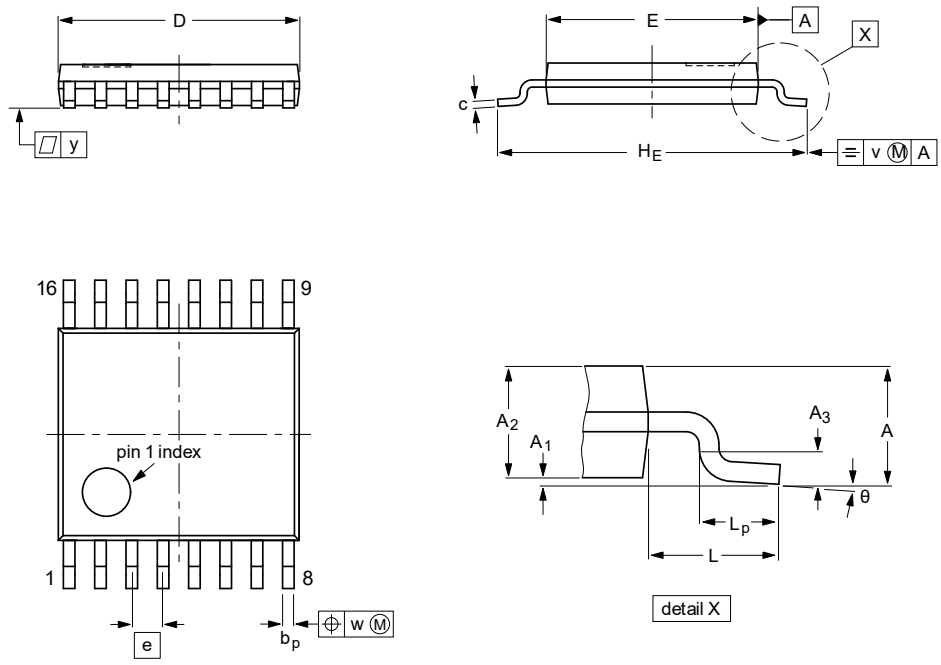
Note
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

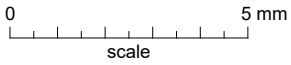
*sot109-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT109-1 | | MS-012 | | | | ~~03-02-19~~ 23-10-27 |

**Fig. 13. Package outline SOT109-1 (SO16)**

**TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm** **SOT403-1**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(2)}$ | e | $H_E$ | L | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.20 | 0.15 | 1.05 | | 0.30 | 0.2 | 5.1 | 4.5 | | 6.6 | | 0.75 | | | | 8° |
| | nom | | | | 0.25 | | | | | 0.65 | | 1 | | 0.2 | 0.1 | 0.1 | |
| | min | | 0.05 | 0.80 | | 0.19 | 0.09 | 4.9 | 4.3 | | 6.2 | | 0.45 | | | | 0° |

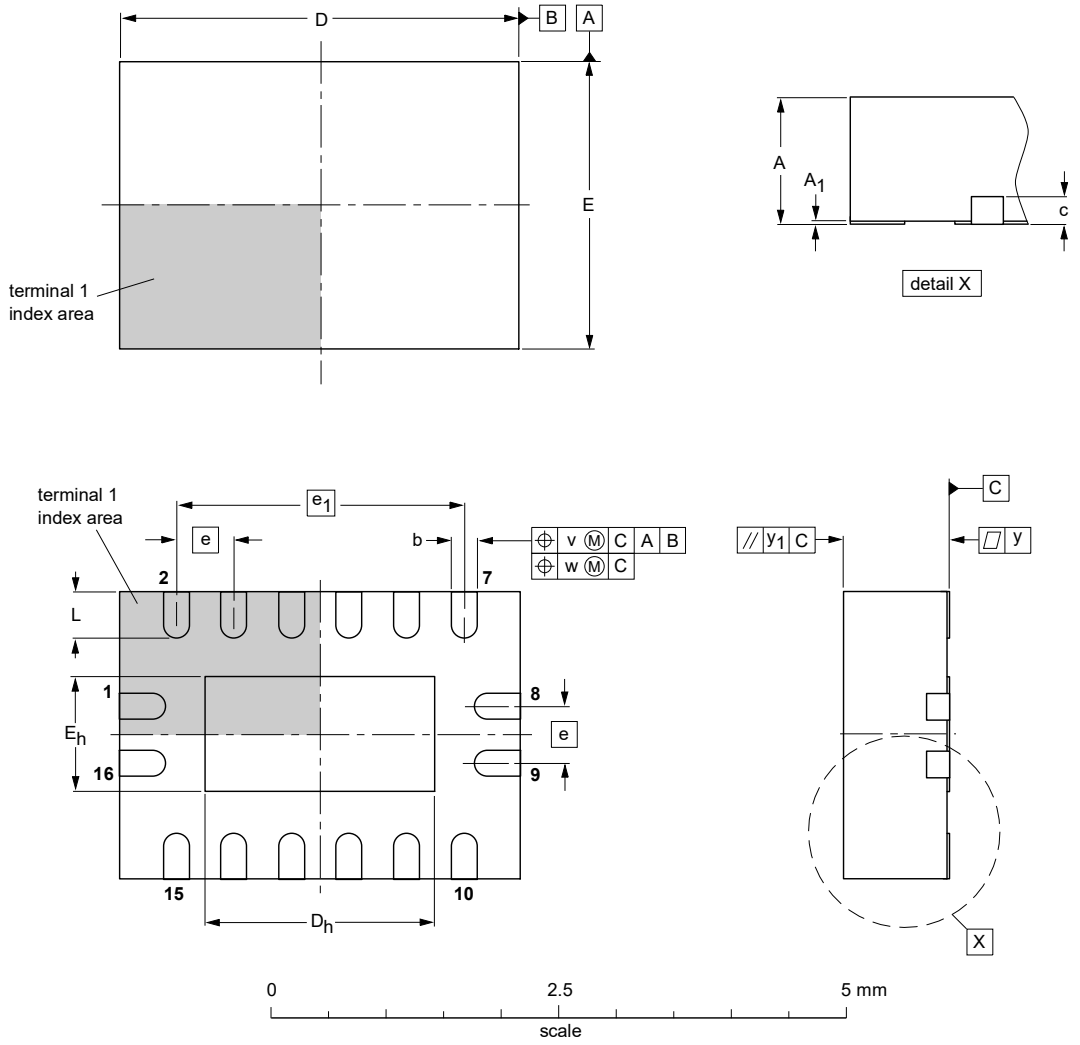
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

*sot403-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT403-1 | | MO-153 | | | | ~~03-02-18~~ 23-10-27 |

**Fig. 14. Package outline SOT403-1 (TSSOP16)**

**DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm** **SOT763-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | $A^{(1)}$ max. | $A_1$ | b | c | $D^{(1)}$ | $D_h$ | $E^{(1)}$ | $E_h$ | e | $e_1$ | L | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 0.05<br>0.00 | 0.30<br>0.18 | 0.2 | 3.6<br>3.4 | 2.15<br>1.85 | 2.6<br>2.4 | 1.15<br>0.85 | 0.5 | 2.5 | 0.5<br>0.3 | 0.1 | 0.05 | 0.05 | 0.1 |

**Note**

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT763-1 | - - - | MO-241 | - - - | | | ~~02-10-17~~<br>03-01-27 |

**Fig. 15. Package outline SOT763-1 (DHVQFN16)**

# 13. Abbreviations

**Table 12. Abbreviations**

| Acronym | Description |
|---|---|
| ANSI | American National Standards Institute |
| CDM | Charged Device Model |
| CMOS | Complementary Metal-Oxide Semiconductor |
| 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_HCT4851 v.5 | 20240530 | Product data sheet | - | 74HC_HCT4851 v.4 |
| Modifications: | • Fig. 13, Fig. 14: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153.<br>• Section 2: ESD specification updated according to the latest JEDEC standard. | | | |
| 74HC_HCT4851 v.4 | 20230515 | Product data sheet | - | 74HC_HCT4851 v.3 |
| Modifications: | • Section 8: Derating values for $P_{tot}$ total power dissipation updated. | | | |
| 74HC_HCT4851 v.3 | 20180824 | Product data sheet | - | 74HC_HCT4851 v.2 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.<br>• Legal texts have been adapted to the new company name where appropriate. | | | |
| 74HC_HCT4851 v.2 | 20080902 | Product data sheet | - | 74HC4851 v.1 |
| Modifications: | • 74HCT4851 device added. | | | |
| 74HC4851 v.1 | 20070309 | Product data sheet | - | - |

# 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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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