

# 74HC4851-Q100; 74HCT4851-Q100

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

Rev. 1 — 2 August 2012

Product data sheet

### 1. General description

The 74HC4851-Q100; 74HCT4851-Q100 are high-speed Si-gate CMOS devices and are specified in compliance with JEDEC standard no. 7A.

The 74HC4851-Q100; 74HCT4851-Q100 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.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

### 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Injection-current cross coupling  $< 1\text{ mV/mA}$
- Wide supply voltage range from 2.0 V to 6.0 V for 74HC4851-Q100
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )
- Latch-up performance exceeds 100 mA per JESD 78 Class II level A
- Low ON-state resistance:
  - ◆  $400\text{ }\Omega$  (typical) at  $V_{CC} = 2.0\text{ V}$
  - ◆  $215\text{ }\Omega$  (typical) at  $V_{CC} = 3.0\text{ V}$
  - ◆  $120\text{ }\Omega$  (typical) at  $V_{CC} = 3.3\text{ V}$
  - ◆  $76\text{ }\Omega$  (typical) at  $V_{CC} = 4.5\text{ V}$
  - ◆  $59\text{ }\Omega$  (typical) at  $V_{CC} = 6.0\text{ V}$



### 3. Applications

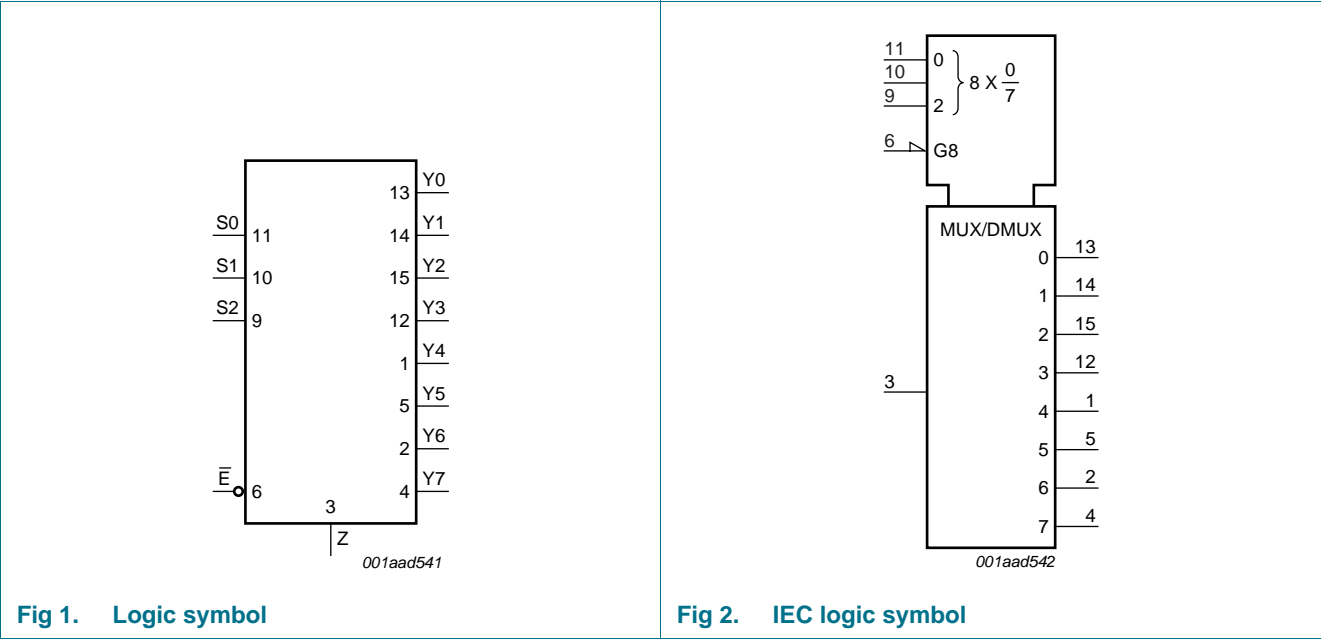
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating
- Automotive application

### 4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC4851D-Q100	−40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT4851D-Q100				
74HC4851PW-Q100	−40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HCT4851PW-Q100				
74HC4851BQ-Q100	−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 × 3.5 × 0.85 mm	SOT763-1
74HCT4851BQ-Q100				

### 5. Functional diagram



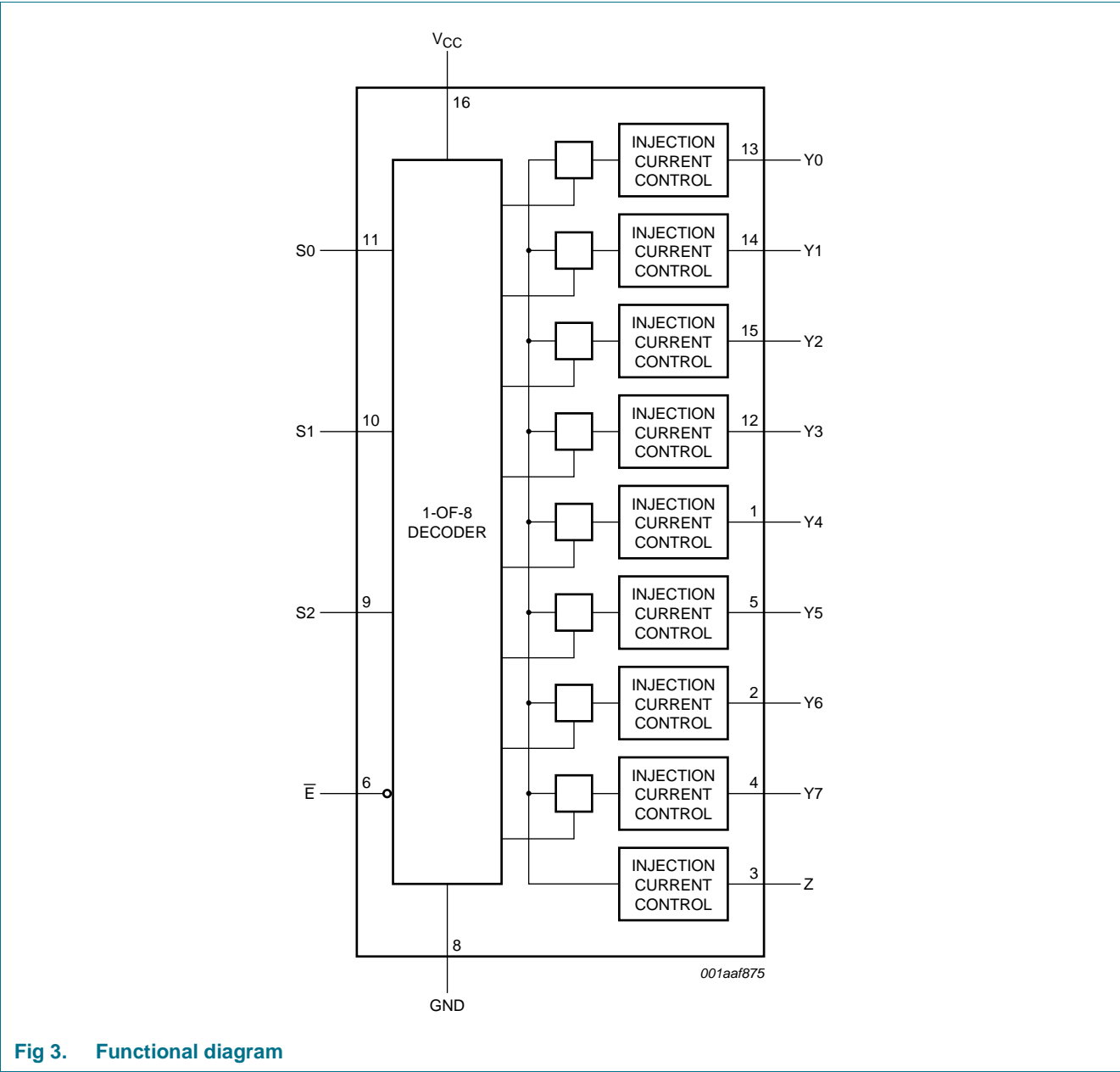
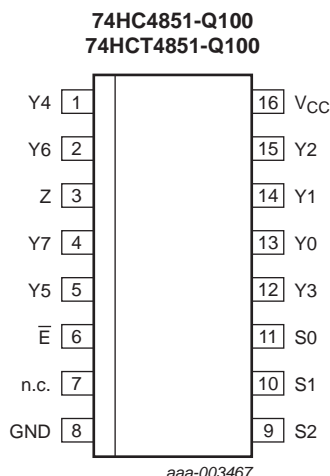


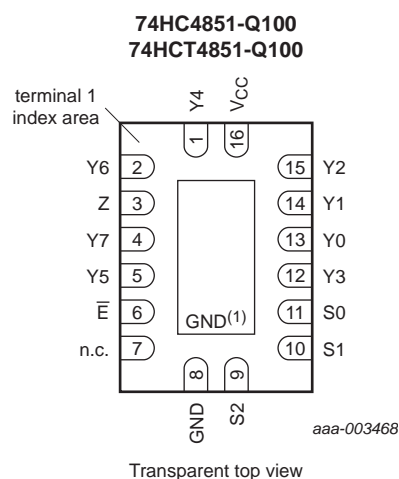
Fig 3. Functional diagram

## 6. Pinning information

### 6.1 Pinning



**Fig 4. Pin configuration SO16 and TSSOP16**



- (1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

**Fig 5. Pin configuration DHVQFN16**

### 6.2 Pin description

**Table 2. Pin description**

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

## 7. Functional description

Table 3. Function table<sup>[1]</sup>

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	-

- [1] H = HIGH voltage level;  
L = LOW voltage level;  
X = don't care.

## 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		<sup>[1]</sup> -0.5	$V_{CC} + 0.5$	V
$V_{SW}$	switch voltage		<sup>[2]</sup> -0.5	$V_{CC} + 0.5$	V
$I_{IK}$	input clamping current	$V_I < -0.5 \text{ V}$ or $V_I > V_{CC} + 0.5 \text{ V}$	-	$\pm 20$	mA
$I_{SK}$	switch clamping current	$V_{SW} < -0.5 \text{ V}$ or $V_{SW} > V_{CC} + 0.5 \text{ V}$	-	$\pm 20$	mA
$I_{SW}$	switch current	$V_{SW} > -0.5 \text{ V}$ or $V_{SW} < V_{CC} + 0.5 \text{ V}$	-	$\pm 25$	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	$T_{amb} = -40 \text{ °C}$ to $+125 \text{ °C}$	<sup>[3]</sup> -	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 SO16 package:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
 For TSSOP16 package:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.  
 For DHVQFN16 packages:  $P_{tot}$  derates linearly with 4.5 mW/K above 60 °C.

## 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	74HC4851-Q100			74HCT4851-Q100			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	$V_{CC} = 2.0\text{ V}$	-	6.0	1000	-	-	-	ns/V
		$V_{CC} = 3.0\text{ V}$	-	6.0	800	-	-	-	ns/V
		$V_{CC} = 3.3\text{ V}$	-	6.0	800	-	-	-	ns/V
		$V_{CC} = 4.5\text{ V}$	-	6.0	500	-	6.0	500	ns/V
		$V_{CC} = 6.0\text{ V}$	-	6.0	400	-	-	-	ns/V

## 10. Static characteristics

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

At recommended operating conditions; voltages are referenced to GND (ground 0 V); For test circuit see [Figure 8](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	

### 74HC4851-Q100

$R_{ON(peak)}$	ON resistance (peak)	$V_I = V_{CC}$ to GND; $\bar{E} = V_{IL}$								
		$V_{CC} = 2.0\text{ V}; I_{SW} = 2\text{ mA}$	-	400	650	-	670	-	700	$\Omega$
		$V_{CC} = 3.0\text{ V}; I_{SW} \leq 2\text{ mA}$	-	215	330	-	360	-	380	$\Omega$
		$V_{CC} = 3.3\text{ V}; I_{SW} \leq 2\text{ mA}$	-	120	270	-	305	-	345	$\Omega$
		$V_{CC} = 4.5\text{ V}; I_{SW} \leq 2\text{ mA}$	-	76	210	-	240	-	270	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_I = 0.5 \times V_{CC}; \bar{E} = V_{IL}$								
		$V_{CC} = 2.0\text{ V}; I_{SW} = 2\text{ mA}$	-	4	10	-	15	-	20	$\Omega$
		$V_{CC} = 3.0\text{ V}; I_{SW} \leq 2\text{ mA}$	-	2	8	-	12	-	16	$\Omega$
		$V_{CC} = 3.3\text{ V}; I_{SW} \leq 2\text{ mA}$	-	2	8	-	12	-	16	$\Omega$
		$V_{CC} = 4.5\text{ V}; I_{SW} \leq 2\text{ mA}$	-	2	8	-	12	-	16	$\Omega$
		$V_{CC} = 6.0\text{ V}; I_{SW} \leq 2\text{ mA}$	-	3	9	-	13	-	18	$\Omega$

### 74HCT4851-Q100

$R_{ON(peak)}$	ON resistance (peak)	$V_I = V_{CC}$ to GND; $\bar{E} = V_{IL}$								
		$V_{CC} = 4.5\text{ V}; I_{SW} \leq 2\text{ mA}$	-	76	210	-	240	-	270	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_I = 0.5 \times V_{CC}; \bar{E} = V_{IL}$								
		$V_{CC} = 4.5\text{ V}; I_{SW} \leq 2\text{ mA}$	-	2	8	-	12	-	16	$\Omega$

**Table 7. Injection current coupling**At recommended operating conditions; voltages are referenced to GND (ground 0 V); For test circuit see [Figure 9](#).

Symbol	Parameter	Conditions	74HC4851/Q100			74HCT4851/Q100			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Typ <sup>[1]</sup>	Max	
T <sub>amb</sub> = −40 °C to +125 °C									
ΔV <sub>O</sub>	output voltage variation	I <sub>SW</sub>   ≤ 1 mA; R <sub>S</sub> ≤ 3.9 kΩ <a href="#">[2][3]</a>							
		V <sub>CC</sub> = 3.3 V	-	0.05	1	-	-	-	mV
		V <sub>CC</sub> = 5.0 V	-	0.03	1	-	0.03	1	mV
		I <sub>SW</sub>   ≤ 10 mA; R <sub>S</sub> ≤ 3.9 kΩ							
		V <sub>CC</sub> = 3.3 V	-	0.55	5	-	-	-	mV
		V <sub>CC</sub> = 5.0 V	-	0.27	5	-	0.27	5	mV
		I <sub>SW</sub>   ≤ 1 mA; R <sub>S</sub> ≤ 20 kΩ							
		V <sub>CC</sub> = 3.3 V	-	0.04	2	-	-	-	mV
		V <sub>CC</sub> = 5.0 V	-	0.03	2	-	0.03	2	mV
		I <sub>SW</sub>   ≤ 10 mA; R <sub>S</sub> ≤ 20 kΩ							
		V <sub>CC</sub> = 3.3 V	-	0.56	20	-	-	-	mV
		V <sub>CC</sub> = 5.0 V	-	0.48	20	-	0.48	20	mV

[1] Typical values are measured at T<sub>amb</sub> = 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-Q100										
V <sub>IH</sub>	HIGH-level input voltage	control inputs								
		V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V <sub>CC</sub> = 3.3 V	2.3	-	-	2.3	-	2.3	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	3.15	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	4.2	-	4.2	-	V
V <sub>IL</sub>	LOW-level input voltage	control inputs								
		V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V <sub>CC</sub> = 3.3 V	-	-	1.0	-	1.0	-	1.0	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	-	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	1.8	-	1.8	-	1.8	V
I <sub>I</sub>	input leakage current	control inputs; V <sub>I</sub> = GND or V <sub>CC</sub>								
		V <sub>CC</sub> = 6.0 V	-	-	±0.1	-	±0.1	-	±1.0	μA

**Table 8.** Static characteristics ...continued

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	
I <sub>S(OFF)</sub>	OFF-state leakage current	$\bar{E} = V_{IH}; V_I = \text{GND or } V_{CC};$ $V_O = V_{CC} \text{ or GND};$ $V_{CC} = 6.0 \text{ V};$ see <a href="#">Figure 6</a>								
		per channel	-	-	±0.1	-	±0.5	-	±1.0	μA
		all channels	-	-	±0.2	-	±2.0	-	±4.0	μA
I <sub>S(ON)</sub>	ON-state leakage current	$\bar{E} = V_{IL}; V_I = \text{GND or } V_{CC};$ $V_O = V_{CC} \text{ or GND};$ $V_{CC} = 6.0 \text{ V};$ see <a href="#">Figure 7</a>	-	-	±0.1	-	±0.5	-	±1.0	μA
I <sub>CC</sub>	supply current	$V_I = \text{GND or } V_{CC}; V_{CC} = 6.0 \text{ V}$	-	-	2.0	-	5.0	-	20.0	μA
C <sub>I</sub>	input capacitance	S0, S1, S2 and $\bar{E}$	-	2	10	-	10	-	10	pF
C <sub>sw</sub>	switch capacitance	Z; OFF-state	-	15	40	-	40	-	40	pF
		Y <sub>n</sub> ; OFF-state	-	3	15	-	15	-	15	pF
74HCT4851-Q100										
V <sub>IH</sub>	HIGH-level input voltage	control inputs								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	-	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	control inputs								
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	0.8	-	0.8	-	0.8	V
I <sub>I</sub>	input leakage current	control inputs; $V_I = \text{GND or } V_{CC}$								
		$V_{CC} = 5.5 \text{ V}$	-	-	±0.1	-	±0.1	-	±1.0	μA
I <sub>S(OFF)</sub>	OFF-state leakage current	$\bar{E} = V_{IH}; V_I = \text{GND or } V_{CC};$ $V_O = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V};$ see <a href="#">Figure 6</a>								
		per channel	-	-	±0.1	-	±0.5	-	±1.0	μA
		all channels	-	-	±0.2	-	±2.0	-	±4.0	μA
I <sub>S(ON)</sub>	ON-state leakage current	$\bar{E} = V_{IL}; V_I = \text{GND or } V_{CC};$ $V_O = V_{CC} \text{ or GND};$ $V_{CC} = 5.5 \text{ V};$ see <a href="#">Figure 7</a>	-	-	±0.1	-	±0.5	-	±1.0	μA
I <sub>CC</sub>	supply current	$V_I = \text{GND or } V_{CC}$								
		$V_{CC} = 5.5 \text{ V}$	-	-	2.0	-	5.0	-	20.0	μA
ΔI <sub>CC</sub>	additional supply current	control inputs; $V_I = V_{CC} - 2.1 \text{ V};$ other inputs at $V_{CC} \text{ or GND};$ $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$	-	-	300	-	370	-	370	μA
C <sub>I</sub>	input capacitance	S0, S1, S2 and $\bar{E}$	-	2	10	-	10	-	10	pF
C <sub>sw</sub>	switch capacitance	Z; OFF-state	-	15	40	-	40	-	40	pF
		Y <sub>n</sub> ; OFF-state	-	3	15	-	15	-	15	pF

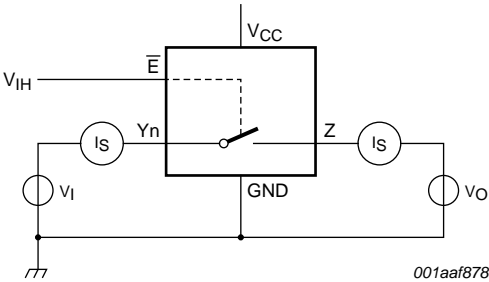
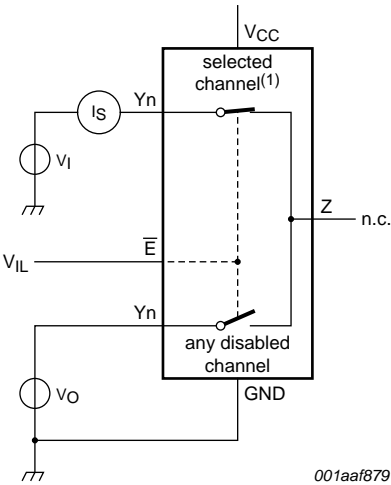
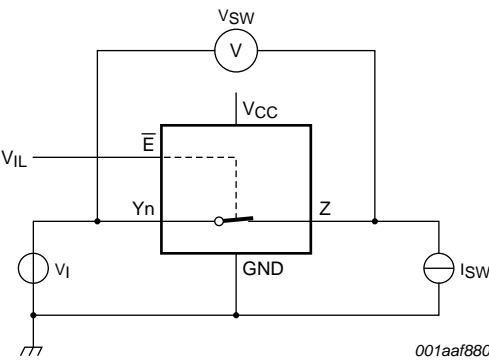


Fig 6. Test circuit for measuring OFF-state leakage current



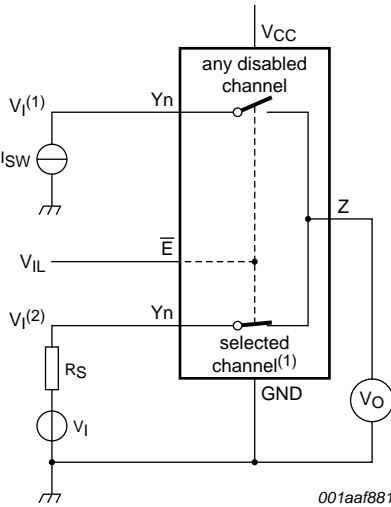
(1) Channel is selected by S0, S1 and S2.

Fig 7. Test circuit for measuring ON-state leakage current



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

Fig 8. 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 9. 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 load circuit see [Figure 14](#).

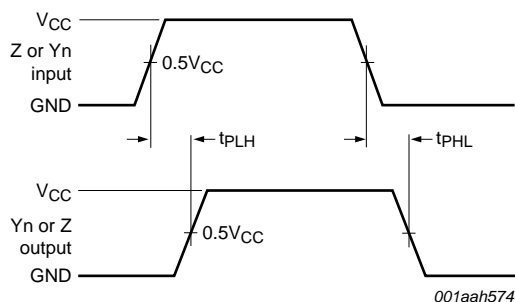
Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC4851-Q100										
t <sub>pd</sub>	propagation delay	Z, Y <sub>n</sub> to Y <sub>n</sub> , Z; see <a href="#">Figure 10</a>	<a href="#">[1]</a>							
		V <sub>CC</sub> = 2.0 V	-	10.0	25	-	29	-	32	ns
		V <sub>CC</sub> = 3.0 V	-	6.0	15.5	-	17.5	-	19.5	ns
		V <sub>CC</sub> = 3.3 V	-	5.0	14.5	-	16.5	-	18.5	ns
		V <sub>CC</sub> = 4.5 V	-	4.0	11.5	-	12.5	-	13.5	ns
		V <sub>CC</sub> = 6.0 V	-	3.0	10	-	11	-	12	ns
		Sn to Z, Y <sub>n</sub> ; see <a href="#">Figure 11</a>	<a href="#">[1]</a>							
		V <sub>CC</sub> = 2.0 V	-	18.0	32	-	35	-	40	ns
		V <sub>CC</sub> = 3.0 V	-	9.5	17.5	-	20	-	23	ns
		V <sub>CC</sub> = 3.3 V	-	8.5	16.5	-	19	-	22	ns
		V <sub>CC</sub> = 4.5 V	-	6.5	13	-	15	-	17	ns
		V <sub>CC</sub> = 6.0 V	-	5.0	12.5	-	14.5	-	16.5	ns
t <sub>en</sub>	enable time	$\overline{E}$ to Z, Y <sub>n</sub> ; see <a href="#">Figure 12</a>	<a href="#">[2]</a>							
		V <sub>CC</sub> = 2.0 V	-	-	95	-	105	-	115	ns
		V <sub>CC</sub> = 3.0 V	-	-	90	-	100	-	110	ns
		V <sub>CC</sub> = 3.3 V	-	-	85	-	95	-	105	ns
		V <sub>CC</sub> = 4.5 V	-	-	80	-	90	-	100	ns
		V <sub>CC</sub> = 6.0 V	-	-	78	-	80	-	80	ns
t <sub>dis</sub>	disable time	$\overline{E}$ to Z, Y <sub>n</sub> ; see <a href="#">Figure 12</a>	<a href="#">[3]</a>							
		V <sub>CC</sub> = 2.0 V	-	-	99	-	105	-	115	ns
		V <sub>CC</sub> = 3.0 V	-	-	90	-	100	-	110	ns
		V <sub>CC</sub> = 3.3 V	-	-	85	-	95	-	105	ns
		V <sub>CC</sub> = 4.5 V	-	-	80	-	90	-	100	ns
		V <sub>CC</sub> = 6.0 V	-	-	78	-	80	-	80	ns
C <sub>PD</sub>	power dissipation capacitance	per channel; see <a href="#">Figure 12</a>	<a href="#">[4]</a>							
		V <sub>CC</sub> = 3.3 V	-	28	-	-	-	-	-	pF
		V <sub>CC</sub> = 5.0 V	-	33	-	-	-	-	-	pF

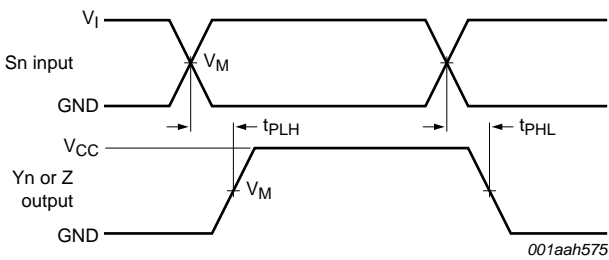
**Table 9. Dynamic characteristics ...continued**At recommended operating conditions; voltages are referenced to GND (ground 0 V); for load circuit see [Figure 14](#).

Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HCT4851-Q100										
t <sub>pd</sub>	propagation delay	Z, Yn to Yn, Z; see <a href="#">Figure 10</a>	<a href="#">[1]</a>							
		V <sub>CC</sub> = 4.5 V	1.6	3.7	11.5	1.1	12.5	1.1	13.5	ns
		Sn to Z, Yn; see <a href="#">Figure 11</a>	<a href="#">[1]</a>							
		V <sub>CC</sub> = 4.5 V	3.2	8.0	13	2.3	15	2.3	17	ns
t <sub>en</sub>	enable time	$\overline{E}$ to Z, Yn; see <a href="#">Figure 12</a>	<a href="#">[2]</a>							
		V <sub>CC</sub> = 4.5 V	4.2	8.6	25	3.0	30	3.0	35	ns
t <sub>dis</sub>	disable time	$\overline{E}$ to Z, Yn; see <a href="#">Figure 12</a>	<a href="#">[3]</a>							
		V <sub>CC</sub> = 4.5 V	28.5	64.7	80	28.2	90	28	100	ns
C <sub>PD</sub>	power dissipation capacitance	per channel; see <a href="#">Figure 13</a>	<a href="#">[4]</a>							
		V <sub>CC</sub> = 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  $\mu\text{W}$ ): $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum \{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  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.

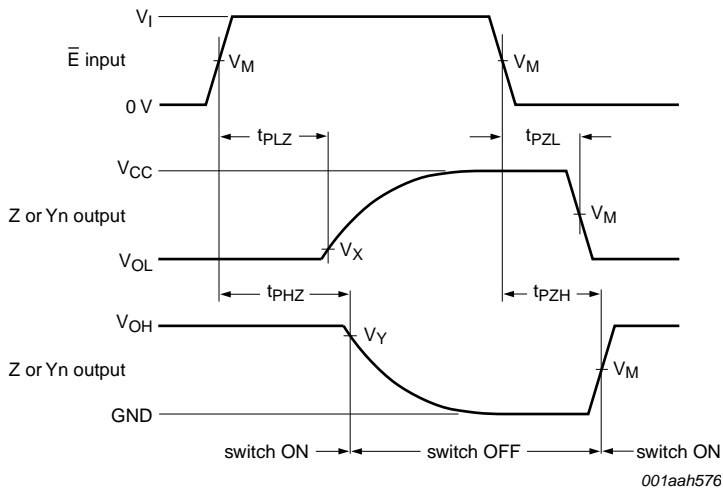
## 12. Waveforms

**Fig 10. Input (Z, Yn) to output (Yn, Z) propagation delays**



Measurement points are given in [Table 10](#).

Fig 11. Input (Sn) to output (Yn, Z) propagation delays



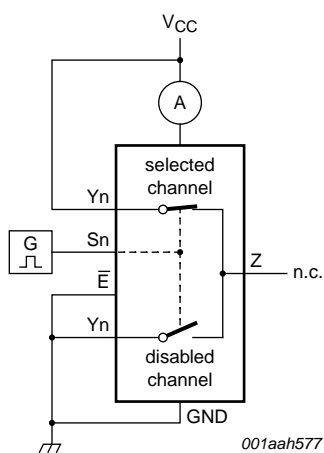
Measurement points are given in [Table 10](#).

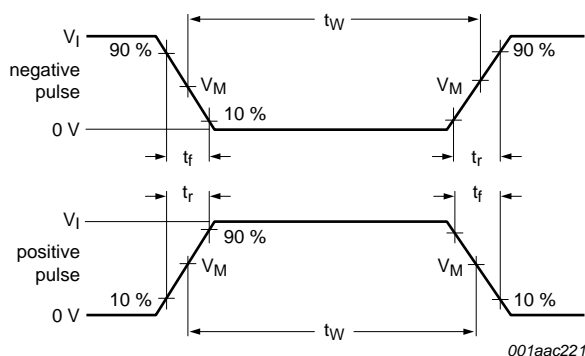
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Fig 12. Enable and disable times

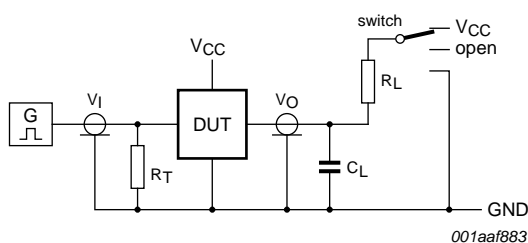
Table 10. Measurement points

Type	Input		Output		
	$V_M$	$V_I$	$V_M$	$V_X$	$V_Y$
74HC4851-Q100	$0.5V_{CC}$	$V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.1(V_{CC} - V_{OL})$	$0.9V_{OH}$
74HCT4851-Q100	1.3 V	3.0 V	$0.5V_{CC}$	$V_{OL} + 0.1(V_{CC} - V_{OL})$	$0.9V_{OH}$

**Fig 13. Test circuit for measuring power dissipation capacitance**



a. Input pulse definition



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. Load circuit

Test data is given in [Table 11](#).

Fig 14. Input pulse definition and load circuit

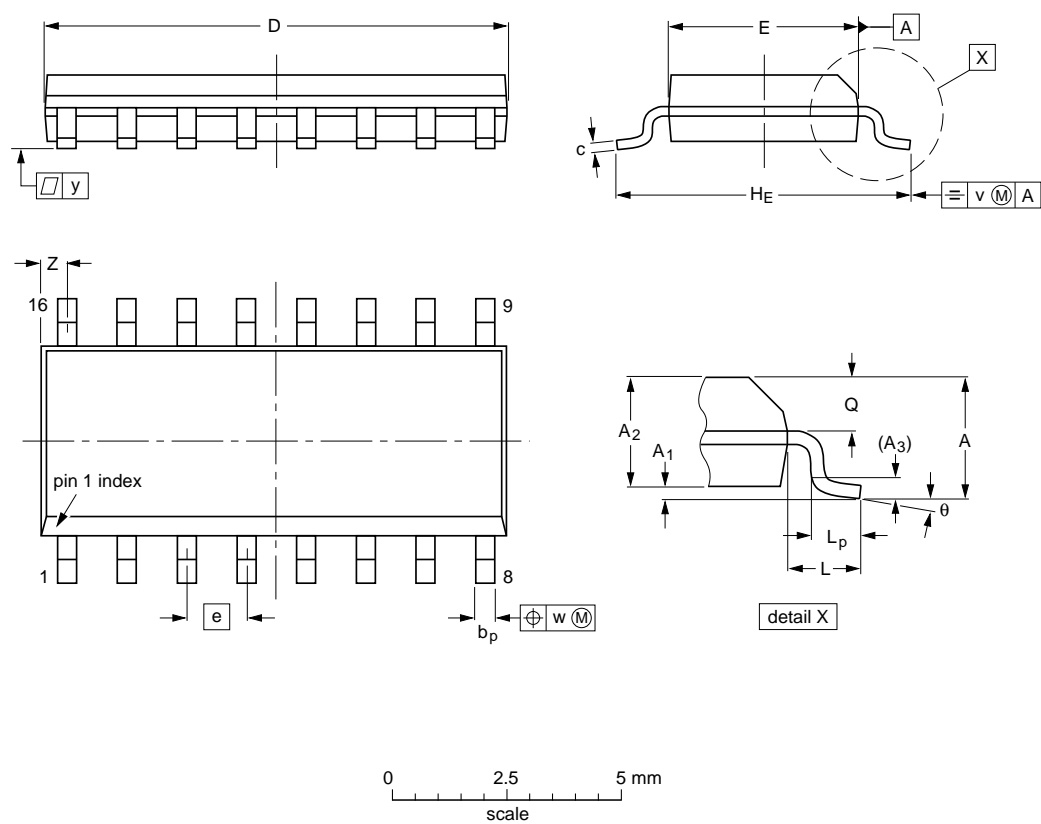
Table 11. Test data

Test	Input			Output		S1 position
	Control $\overline{E}$ , Sn	Switch Yn (Z)	$t_r, t_f$	Switch Z (Yn)		
	$V_I$ <sup>[1]</sup>	$V_I$		$C_L$	$R_L$	
$t_{PHL}, t_{PLH}$	$V_{CC}$	$V_{CC}$	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-Q100: input voltage  $V_I = 3.0$  V.

13. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mmSOT109-1



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

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				99-12-27- 03-02-19

Fig 15. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

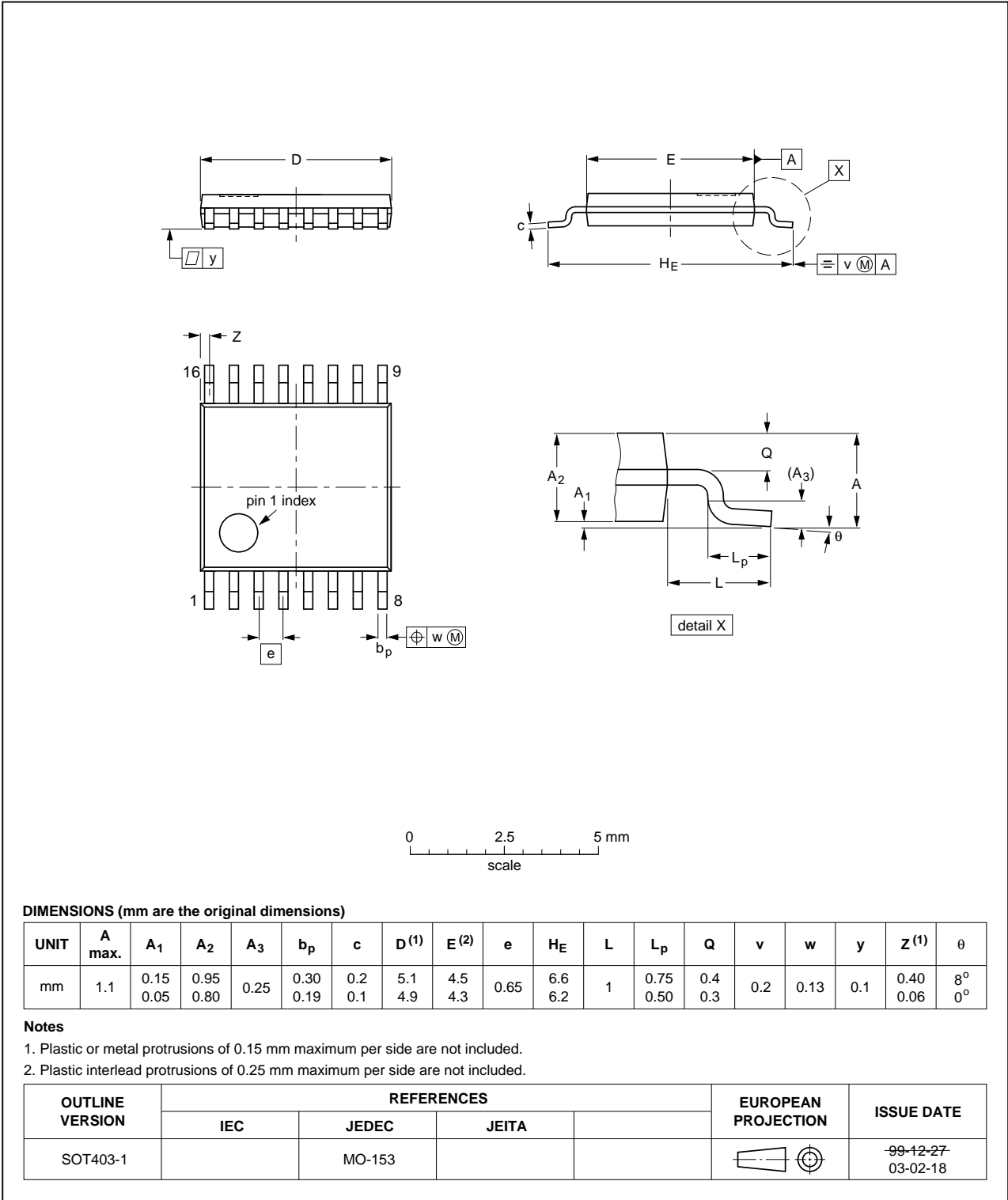


Fig 16. Package outline SOT403-1 (TSSOP16)

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

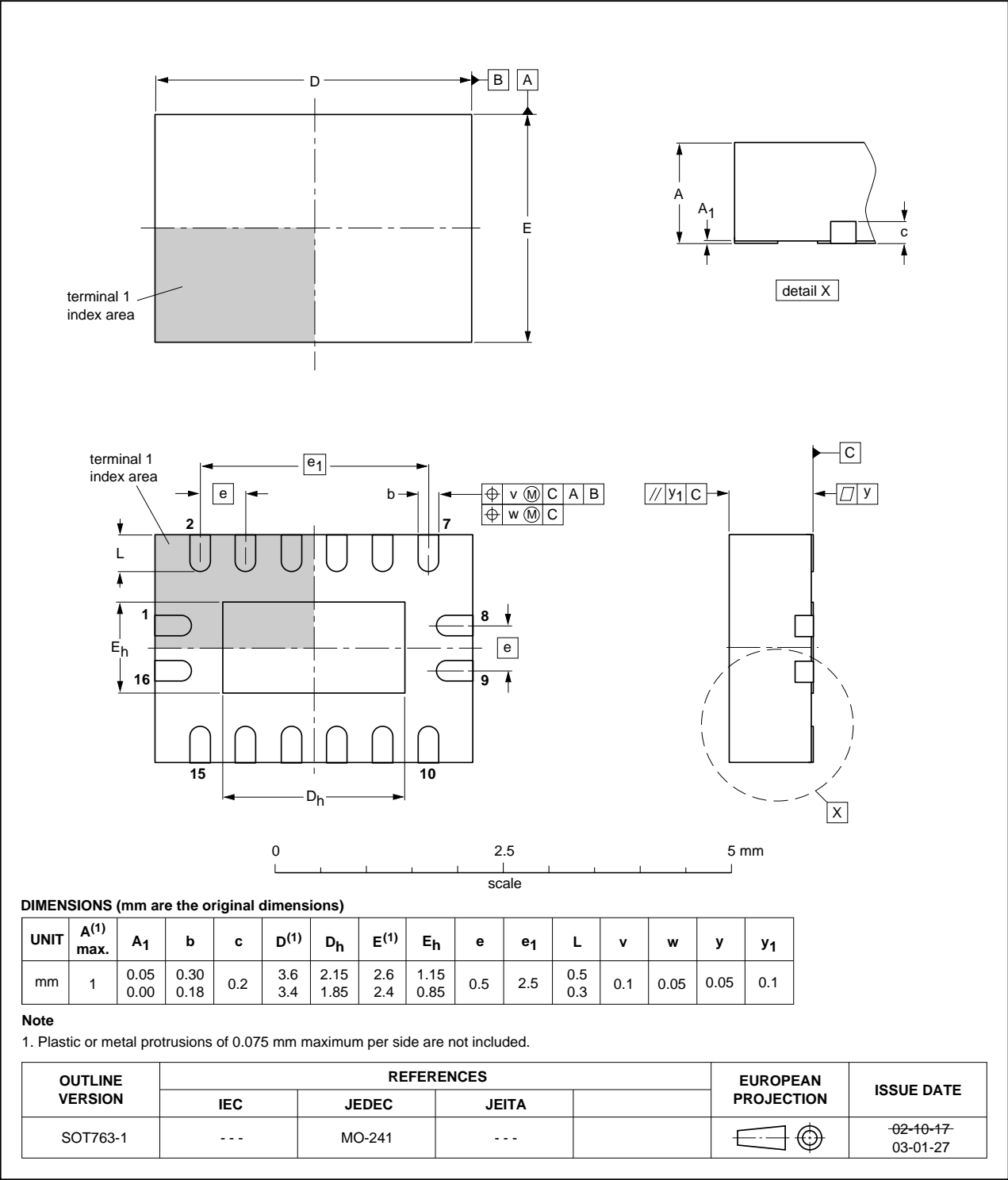


Fig 17. Package outline SOT763-1 (DHVQFN16)

## 14. Abbreviations

Table 12. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
MIL	Military

## 15. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4851_Q100 v.1	20120802	Product data sheet	-	-

## 16. Legal information

### 16.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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