

# 74HC4066; 74HCT4066

Quad single-pole single-throw analog switch

Rev. 8 — 3 December 2015

Product data sheet

## 1. General description

The 74HC4066; 74HCT4066 is a quad single pole, single throw analog switch. Each switch features two input/output terminals (nY and nZ) and an active HIGH enable input (nE). When nE is LOW, the analog switch is 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

- Input levels nE inputs:
  - ◆ For 74HC4066: CMOS level
  - ◆ For 74HCT4066: TTL level
- Low ON resistance:
  - ◆ 50  $\Omega$  (typical) at  $V_{CC} = 4.5$  V
  - ◆ 45  $\Omega$  (typical) at  $V_{CC} = 6.0$  V
  - ◆ 35  $\Omega$  (typical) at  $V_{CC} = 9.0$  V
- Specified in compliance with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

**nexperia**

### 3. Ordering information

Table 1. Ordering information

Type number	Package	Temperature range	Name	Description	Version
74HC4066D		-40 °C to +125 °C	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
74HCT4066D					
74HC4066DB		-40 °C to +125 °C	SSOP14	plastic shrink small outline package; 14 leads; body width 5.3 mm	SOT337-1
74HCT4066DB					
74HC4066PW		-40 °C to +125 °C	TSSOP14	plastic thin shrink small outline package; 14 leads; body width 4.4 mm	SOT402-1
74HCT4066PW					
74HC4066BQ		-40 °C to +125 °C	DHVQFN14	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm	SOT762-1
74HCT4066BQ					

### 4. Functional diagram

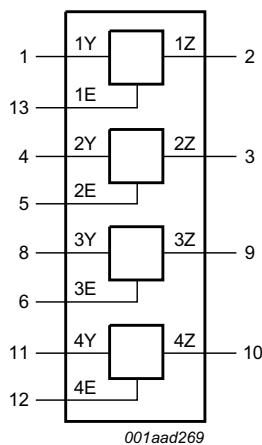


Fig 1. Logic symbol

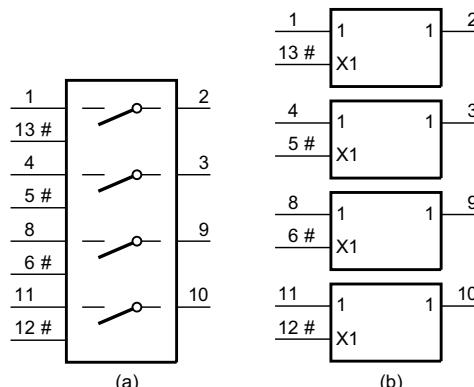


Fig 2. IEC logic symbol

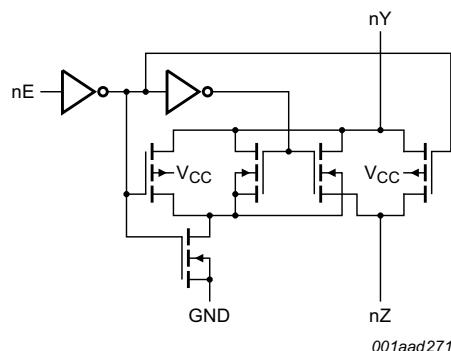


Fig 3. Schematic diagram (one switch)

## 5. Pinning information

### 5.1 Pinning

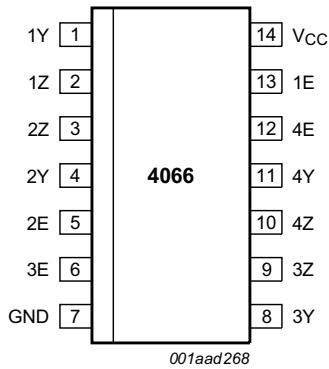


Fig 4. Pin configuration for SO14 and (T)SSOP14

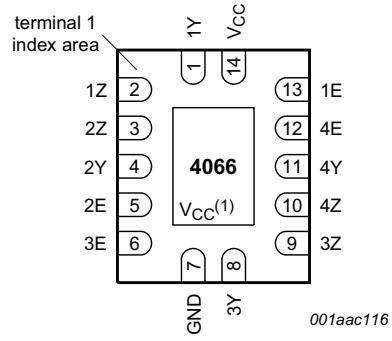


Fig 5. Pin configuration for DHVQFN14

(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 V<sub>CC</sub>.

Transparent top view

### 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1Z, 2Z, 3Z, 4Z	2, 3, 9, 10	independent input or output
1Y, 2Y, 3Y, 4Y	1, 4, 8, 11	independent input or output
GND	7	ground (0 V)
1E, 2E, 3E, 4E	13, 5, 6, 12	enable input (active HIGH)
V <sub>CC</sub>	14	supply voltage

## 6. Functional description

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

Input nE	Switch
L	OFF
H	ON

[1] H = HIGH voltage level;  
L = LOW voltage level.

## 7. 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 <sub>CC</sub>	supply voltage		-0.5	+11.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V	-	±20	mA
I <sub>SK</sub>	switch clamping current	V <sub>SW</sub> < -0.5 V or V <sub>SW</sub> > V <sub>CC</sub> + 0.5 V	-	±20	mA
I <sub>SW</sub>	switch current	V <sub>SW</sub> = -0.5 V to V <sub>CC</sub> + 0.5 V	[1]	-	±25 mA
I <sub>CC</sub>	supply current		-	50	mA
I <sub>GND</sub>	ground current		-	-50	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C [2] SO14, (T)SSOP14 and DHVQFN14 packages		-	500 mW
P	power dissipation	per switch	-	100	mW

[1] To avoid drawing V<sub>CC</sub> current out of terminal Z, when switch current flows in terminals Y<sub>n</sub>, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no V<sub>CC</sub> current will flow out of terminals Y<sub>n</sub>. In this case there is no limit for the voltage drop across the switch, but the voltages at Y<sub>n</sub> and Z may not exceed V<sub>CC</sub> or GND.

[2] For SO14 package: P<sub>tot</sub> derates linearly with 8 mW/K above 70 °C.

For (T)SSOP14 packages: P<sub>tot</sub> derates linearly with 5.5 mW/K above 60 °C.

For DHVQFN14 packages: P<sub>tot</sub> derates linearly with 4.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	74HC4066			74HCT4066			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	10.0	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		GND	-	V <sub>CC</sub>	GND	-	V <sub>CC</sub>	V
V <sub>SW</sub>	switch voltage		GND	-	V <sub>CC</sub>	GND	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 2.0 V	-	-	625	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V <sub>CC</sub> = 6.0 V	-	-	83	-	-	-	ns/V
		V <sub>CC</sub> = 10.0 V	-	-	35	-	-	-	ns/V

## 9. Static characteristics

**Table 6.  $R_{ON}$  resistance per switch for types 74HC4066 and 74HCT4066**

$V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see [Figure 6](#).

$V_{IS}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{OS}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

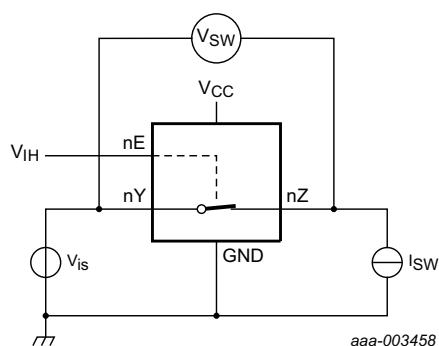
For 74HC4066:  $V_{CC} - GND = 2.0$  V, 4.5 V, 6.0 V and 9.0 V.

For 74HCT4066:  $V_{CC} - GND = 4.5$  V.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	$V_{IS} = V_{CC}$ to GND						
		$V_{CC} = 2.0$ V; $I_{SW} = 100$ $\mu$ A <sup>[2]</sup>	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V; $I_{SW} = 1000$ $\mu$ A	-	54	-	118	142	$\Omega$
		$V_{CC} = 6.0$ V; $I_{SW} = 1000$ $\mu$ A	-	42	-	105	126	$\Omega$
		$V_{CC} = 9.0$ V; $I_{SW} = 1000$ $\mu$ A	-	32	-	88	105	$\Omega$
$R_{ON(rail)}$	ON resistance (rail)	$V_{IS} = GND$						
		$V_{CC} = 2.0$ V; $I_{SW} = 100$ $\mu$ A <sup>[2]</sup>	-	80	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V; $I_{SW} = 1000$ $\mu$ A	-	35	-	95	115	$\Omega$
		$V_{CC} = 6.0$ V; $I_{SW} = 1000$ $\mu$ A	-	27	-	82	100	$\Omega$
		$V_{CC} = 9.0$ V; $I_{SW} = 1000$ $\mu$ A	-	20	-	70	85	$\Omega$
		$V_{IS} = V_{CC}$						
		$V_{CC} = 2.0$ V; $I_{SW} = 100$ $\mu$ A <sup>[2]</sup>	-	100	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V; $I_{SW} = 1000$ $\mu$ A	-	42	-	106	128	$\Omega$
		$V_{CC} = 6.0$ V; $I_{SW} = 1000$ $\mu$ A	-	35	-	94	113	$\Omega$
		$V_{CC} = 9.0$ V; $I_{SW} = 1000$ $\mu$ A	-	20	-	78	95	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_{IS} = V_{CC}$ to GND						
		$V_{CC} = 2.0$ V <sup>[2]</sup>	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V	-	5	-	-	-	$\Omega$
		$V_{CC} = 6.0$ V	-	4	-	-	-	$\Omega$
		$V_{CC} = 9.0$ V	-	3	-	-	-	$\Omega$

[1] Typical values are measured at  $T_{amb} = 25$  °C.

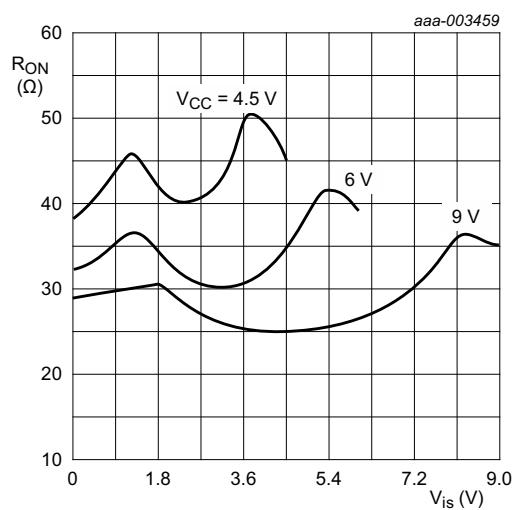
[2] At supply voltages ( $V_{CC} - GND$ ) approaching 2 V, the analog switch ON resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.



$$V_{IS} = 0 \text{ V to } V_{CC}$$

$$R_{ON} = \frac{V_{SW}}{I_{SW}}$$

**Fig 6. Test circuit for measuring  $R_{ON}$**



$$V_{IS} = 0 \text{ V to } V_{CC}$$

**Fig 7. Typical  $R_{ON}$  as a function of input voltage  $V_{IS}$**

**Table 7. Static characteristics 74HC4066**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

$V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{os}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	V
		V <sub>CC</sub> = 4.5 V	3.15	2.4	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	V
		V <sub>CC</sub> = 9.0 V	6.3	4.7	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	V
		V <sub>CC</sub> = 4.5 V	-	2.1	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.80	V
		V <sub>CC</sub> = 9.0 V	-	4.3	2.70	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND				
		V <sub>CC</sub> = 6.0 V	-	-	±1.0	µA
		V <sub>CC</sub> = 10.0 V	-	-	±2.0	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>sw</sub>   = V <sub>CC</sub> - GND; see <a href="#">Figure 8</a>				
		per channel	-	-	±1.0	µA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>sw</sub>   = V <sub>CC</sub> - GND; see <a href="#">Figure 9</a>	-	-	±1.0	µA

Table 7. Static characteristics 74HC4066 ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

 $V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input. $V_{os}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = GND$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	20.0	$\mu A$
		$V_{CC} = 10.0$ V	-	-	40.0	$\mu A$
$C_I$	input capacitance		-	3.5	-	pF
$C_{sw}$	switch capacitance		-	8	-	pF
<b><math>T_{amb} = -40</math> °C to +125 °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0$ V	1.5	-	-	V
		$V_{CC} = 4.5$ V	3.15	-	-	V
		$V_{CC} = 6.0$ V	4.2	-	-	V
		$V_{CC} = 9.0$ V	6.3	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0$ V	-	-	0.50	V
		$V_{CC} = 4.5$ V	-	-	1.35	V
		$V_{CC} = 6.0$ V	-	-	1.80	V
		$V_{CC} = 9.0$ V	-	-	2.70	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	$\pm 1.0$	$\mu A$
		$V_{CC} = 10.0$ V	-	-	$\pm 2.0$	$\mu A$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{sw}  = V_{CC} - GND$ ; see <a href="#">Figure 8</a>				
		per channel	-	-	$\pm 1.0$	$\mu A$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0$ V; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{sw}  = V_{CC} - GND$ ; see <a href="#">Figure 9</a>	-	-	$\pm 1.0$	$\mu A$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = GND$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND				
		$V_{CC} = 6.0$ V	-	-	40	$\mu A$
		$V_{CC} = 10.0$ V	-	-	80	$\mu A$

[1] Typical values are measured at  $T_{amb} = 25$  °C.

Table 8. Static characteristics 74HCT4066

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

 $V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input. $V_{os}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b><math>T_{amb} = -40</math> °C to +85 °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	1.6	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	1.2	0.8	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	$\pm 1.0$	$\mu A$

**Table 8. Static characteristics 74HCT4066 ...continued**

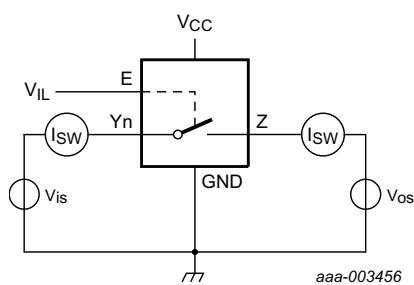
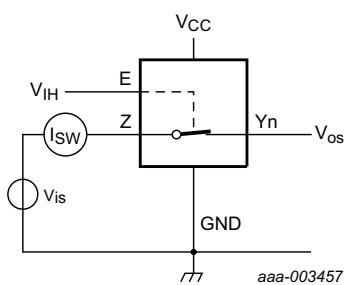
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

 $V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input. $V_{os}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 8</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 9</a>	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	20.0	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	100	450	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	$\text{pF}$
$C_{sw}$	switch capacitance		-	8	-	$\text{pF}$

 **$T_{amb} = -40 \text{ }^{\circ}\text{C}$  to  $+125 \text{ }^{\circ}\text{C}$** 

$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	0.8	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 8</a>				
		per channel	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 9</a>	-	-	$\pm 1.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	40	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}$ ; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	490	$\mu\text{A}$

[1] Typical values are measured at  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ .
 $V_{is} = V_{CC}$  and  $V_{os} = \text{GND}$   
 $V_{is} = \text{GND}$  and  $V_{os} = V_{CC}$ 
**Fig 8. Test circuit for measuring OFF-state leakage current**
 $V_{is} = V_{CC}$  and  $V_{os} = \text{open}$   
 $V_{is} = \text{GND}$  and  $V_{os} = \text{open}$ 
**Fig 9. Test circuit for measuring ON-state leakage current**

## 10. Dynamic characteristics

**Table 9. Dynamic characteristics 74HC4066**

$GND = 0 \text{ V}$ ;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$  unless specified otherwise; for test circuit see [Figure 12](#).

$V_{IS}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{OS}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$t_{pd}$	propagation delay	nY to nZ or nZ to nY; $R_L = \infty \Omega$ ; <a href="#">[2]</a> see <a href="#">Figure 10</a>						
		$V_{CC} = 2.0 \text{ V}$	-	8	75	-	90	ns
		$V_{CC} = 4.5 \text{ V}$	-	3	15	-	18	ns
		$V_{CC} = 6.0 \text{ V}$	-	2	13	-	15	ns
		$V_{CC} = 9.0 \text{ V}$	-	2	10	-	12	ns
$t_{off}$	turn-off time	nE to nY or nZ; see <a href="#">Figure 11</a> <a href="#">[4]</a>						
		$V_{CC} = 2.0 \text{ V}$	-	44	190	-	225	ns
		$V_{CC} = 4.5 \text{ V}$	-	16	38	-	45	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	-	13	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}$	-	13	33	-	38	ns
		$V_{CC} = 9.0 \text{ V}$	-	16	26	-	30	ns
$t_{on}$	turn-on time	nE to nY or nZ; see <a href="#">Figure 11</a> <a href="#">[3]</a>						
		$V_{CC} = 2.0 \text{ V}$	-	36	125	-	150	ns
		$V_{CC} = 4.5 \text{ V}$	-	13	25	-	30	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	-	11	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}$	-	10	21	-	26	ns
		$V_{CC} = 9.0 \text{ V}$	-	8	16	-	20	ns
$C_{PD}$	power dissipation capacitance	per switch; $V_I = GND$ to $V_{CC}$ <a href="#">[5]</a>	11		-	-	-	pF

[1] Typical values are measured at  $T_{amb} = 25 \text{ °C}$ .

[2]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[3]  $t_{on}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_{off}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[5]  $C_{PD}$  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.

**Table 10. Dynamic characteristics 74HCT4066**

$GND = 0 \text{ V}$ ;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$  unless specified otherwise; for test circuit see [Figure 12](#).

$V_{IS}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{OS}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$t_{PD}$	propagation delay	nY to nZ or nZ to nY; $R_L = \infty \Omega$ ; see <a href="#">Figure 10</a>	[2]					
		$V_{CC} = 4.5 \text{ V}$		-	3	15	-	18 ns
$t_{OFF}$	turn-off time	nE to nY or nZ; see <a href="#">Figure 11</a>	[4]					
		$V_{CC} = 4.5 \text{ V}$		-	20	44	-	53 ns
		$V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$		-	16	-	-	- ns
$t_{ON}$	turn-on time	nE to nY or nZ; see <a href="#">Figure 11</a>	[3]					
		$V_{CC} = 4.5 \text{ V}$		-	12	30	-	36 ns
		$V_{CC} = 5.0 \text{ V}$ ; $C_L = 15 \text{ pF}$		-	12	-	-	- ns
$C_{PD}$	power dissipation capacitance	per switch; $V_I = GND$ to $(V_{CC} - 1.5 \text{ V})$	[5]	-	12	-	-	pF

[1] Typical values are measured at  $T_{amb} = 25 \text{ °C}$ .

[2]  $t_{PD}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[3]  $t_{ON}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_{OFF}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[5]  $C_{PD}$  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;

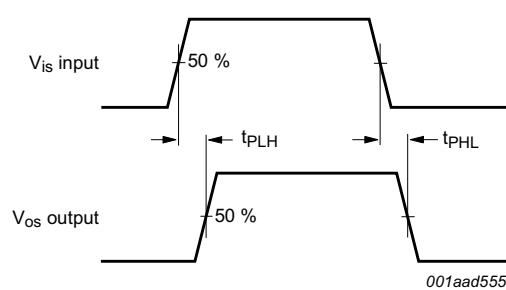
$\sum\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;

$C_L$  = output load capacitance in pF;

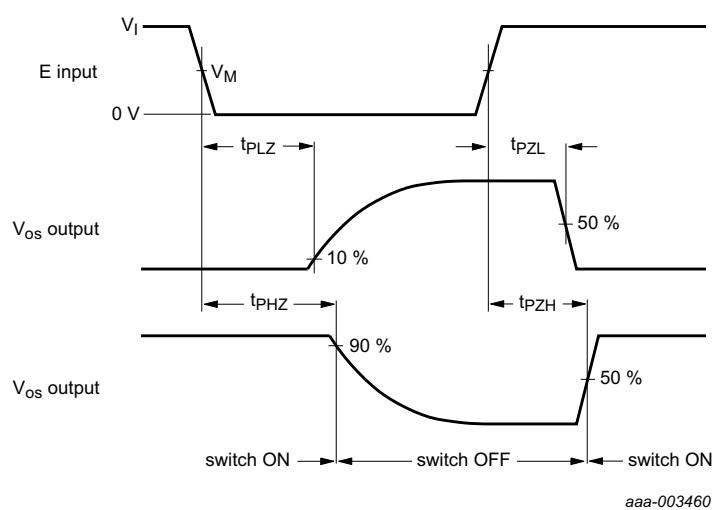
$C_{sw}$  = switch capacitance in pF;

$V_{CC}$  = supply voltage in V.

## 11. Waveforms



**Fig 10. Input ( $V_{IS}$ ) to output ( $V_{OS}$ ) propagation delays**

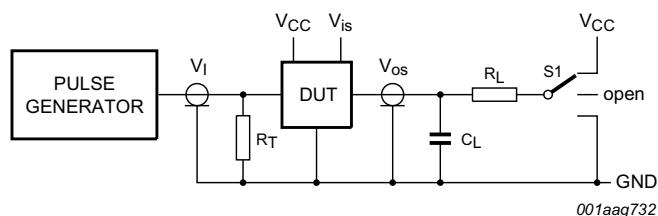
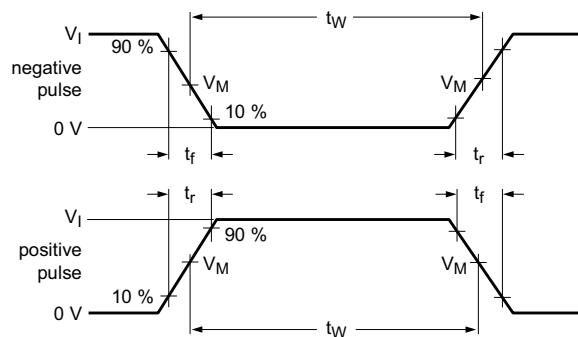


Measurement points are shown in [Table 11](#).

**Fig 11. Turn-on and turn-off times**

**Table 11. Measurement points**

Type	$V_I$	$V_M$
74HC4066	$V_{CC}$	$0.5V_{CC}$
74HCT4066	3.0 V	1.3 V



001aag732

Test data is given in [Table 12](#).

Definitions test circuit:

$R_T$  = Termination resistance should be equal to output impedance  $Z_0$  of the pulse generator.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_L$  = Load resistance.

$S1$  = Test selection switch.

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

**Table 12. Test data**

Test	Input			Output		S1 position	
	Control E	Switch $Y_n$ (Z)	$t_r, t_f$	Switch Z ( $Y_n$ )			
	$V_I$ <sup>[1]</sup>	$V_{is}$		$C_L$	$R_L$		
$t_{PHL}, t_{PLH}$	GND	GND to $V_{CC}$	6 ns	50 pF	-	open	
$t_{PHZ}, t_{PZH}$	GND to $V_{CC}$	$V_{CC}$	6 ns	50 pF, 15 pF	1 k $\Omega$	GND	
$t_{PLZ}, t_{PZL}$	GND to $V_{CC}$	GND	6 ns	50 pF, 15 pF	1 k $\Omega$	$V_{CC}$	

[1] For 74HCT4066: maximum input voltage  $V_I = 3.0$  V.

## 12. Additional dynamic characteristics

**Table 13. Additional dynamic characteristics**

Recommended conditions and typical values;  $GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

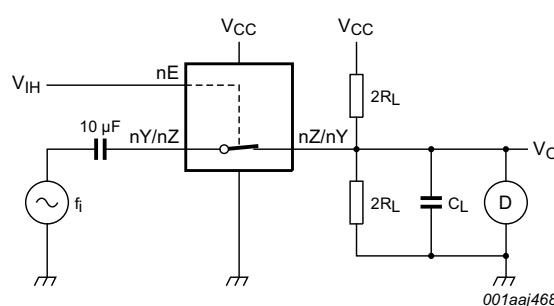
$V_{IS}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

$V_{OS}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

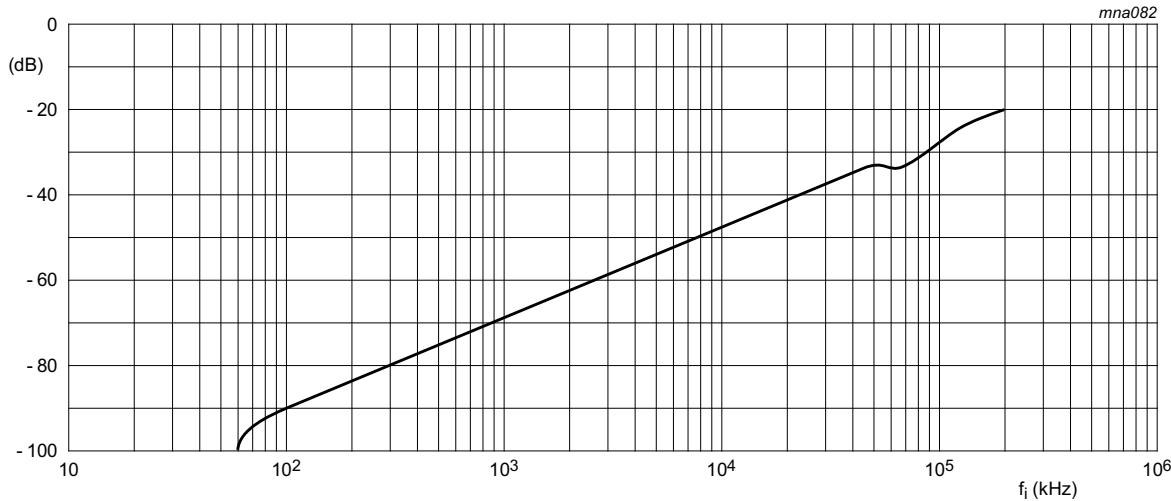
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	$f_i = 1\text{ kHz}$ ; $R_L = 10\text{ k}\Omega$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 13</a>				%
		$V_{CC} = 4.5\text{ V}$ ; $V_I = 4.0\text{ V}$ (p-p)	-	0.04	-	%
		$V_{CC} = 9.0\text{ V}$ ; $V_I = 8.0\text{ V}$ (p-p)	-	0.02	-	%
		$f_i = 10\text{ kHz}$ ; $R_L = 10\text{ k}\Omega$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 13</a>				
		$V_{CC} = 4.5\text{ V}$ ; $V_I = 4.0\text{ V}$ (p-p)	-	0.12	-	%
		$V_{CC} = 9.0\text{ V}$ ; $V_I = 8.0\text{ V}$ (p-p)	-	0.06	-	%
$f_{(-3\text{dB})}$	-3 dB frequency response	$R_L = 50\text{ }\Omega$ ; $C_L = 10\text{ pF}$ ; see <a href="#">Figure 15</a> [2]				
		$V_{CC} = 4.5\text{ V}$	-	180	-	MHz
		$V_{CC} = 9.0\text{ V}$	-	200	-	MHz
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; see <a href="#">Figure 14</a>	[1]			
		$V_{CC} = 4.5\text{ V}$	-	-50	-	dB
		$V_{CC} = 9.0\text{ V}$	-	-50	-	dB
$V_{ct}$	crosstalk voltage	between digital input and switch (peak to peak value); $R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; see <a href="#">Figure 16</a>				
		$V_{CC} = 4.5\text{ V}$	-	110	-	mV
		$V_{CC} = 9.0\text{ V}$	-	220	-	mV
Xtalk	crosstalk	between switches; $R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ; see <a href="#">Figure 17</a>	[1]			
		$V_{CC} = 4.5\text{ V}$	-	-60	-	dB
		$V_{CC} = 9.0\text{ V}$	-	-60	-	dB

[1] Adjust input voltage  $V_{IS}$  to 0 dBm level (0 dBm = 1 mW into  $600\text{ }\Omega$ ).

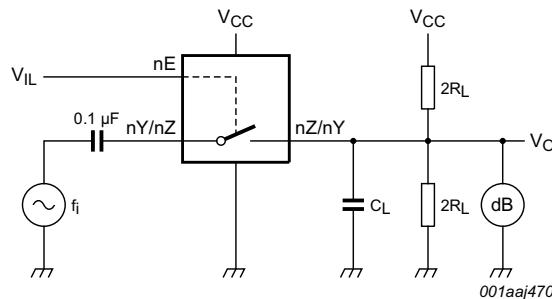
[2] Adjust input voltage  $V_{IS}$  to 0 dBm level at  $V_{OS}$  for  $f_i = 1\text{ MHz}$  (0 dBm = 1 mW into  $50\text{ }\Omega$ ). After set-up,  $f_i$  is increased to obtain a reading of  $-3\text{ dB}$  at  $V_{OS}$ .



**Fig 13. Test circuit for measuring total harmonic distortion**



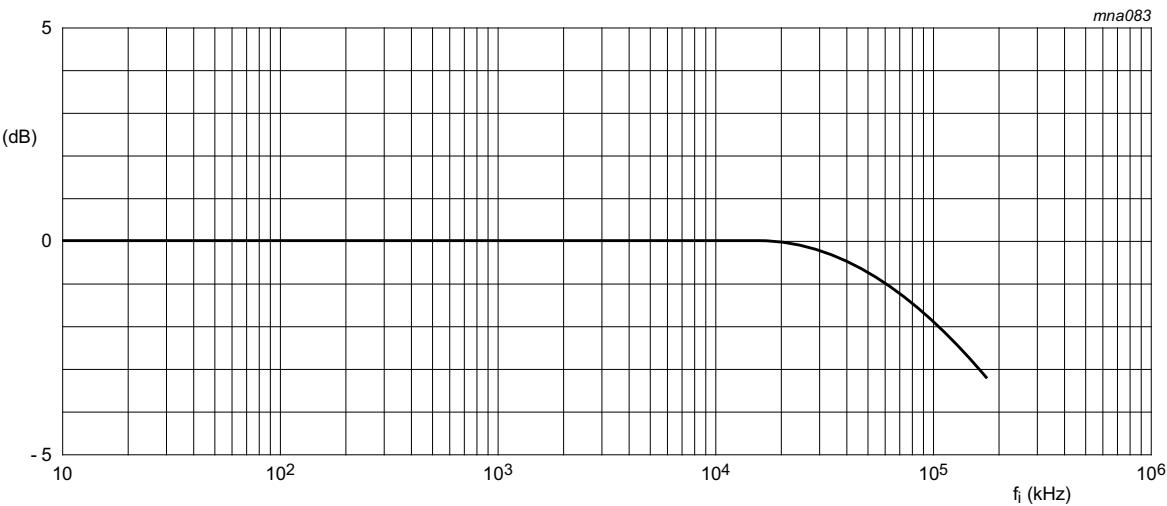
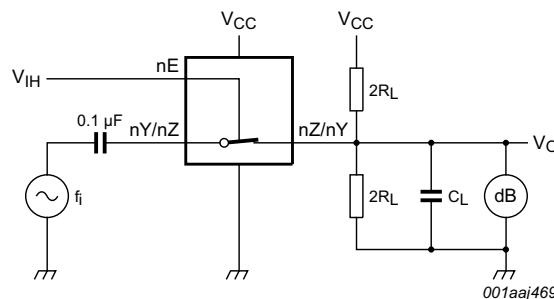
a. Isolation (OFF-state)



b. Test circuit

$V_{CC} = 4.5$  V; GND = 0 V;  $R_L = 600 \Omega$ ;  $R_{source} = 1 \text{ k}\Omega$ .

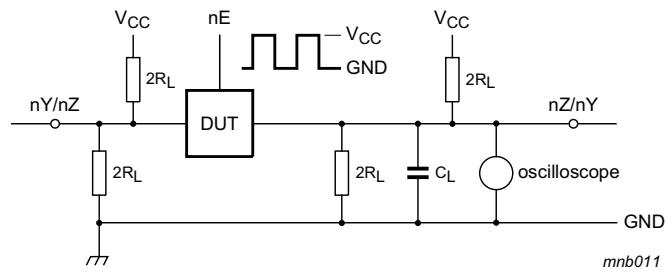
Fig 14. Isolation (OFF-state) as a function of frequency

a. Typical  $-3$  dB frequency response

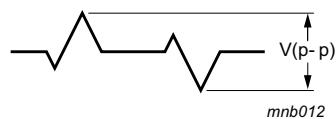
b. Test circuit

$V_{CC} = 4.5$  V; GND = 0 V;  $R_L = 50$  Ω;  $R_{source} = 1$  kΩ.

Fig 15.  $-3$  dB frequency response



a. Circuit



b. Crosstalk voltage

Fig 16. Test circuit for measuring crosstalk voltage (between the digital input and the switch)

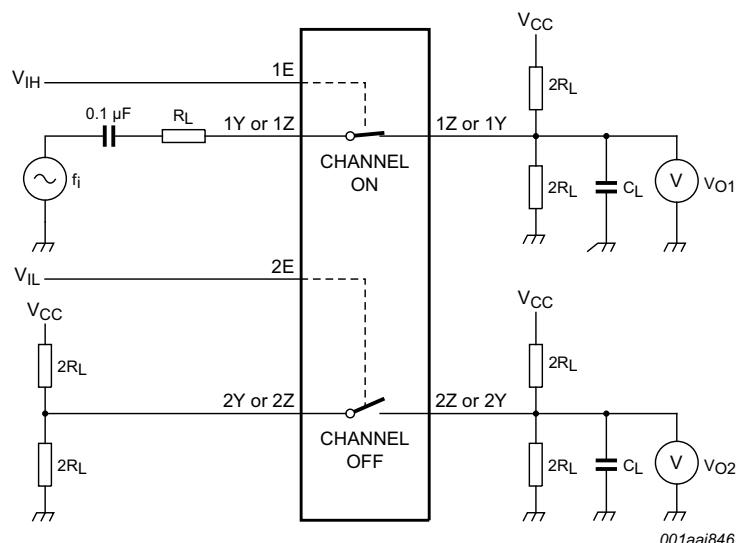
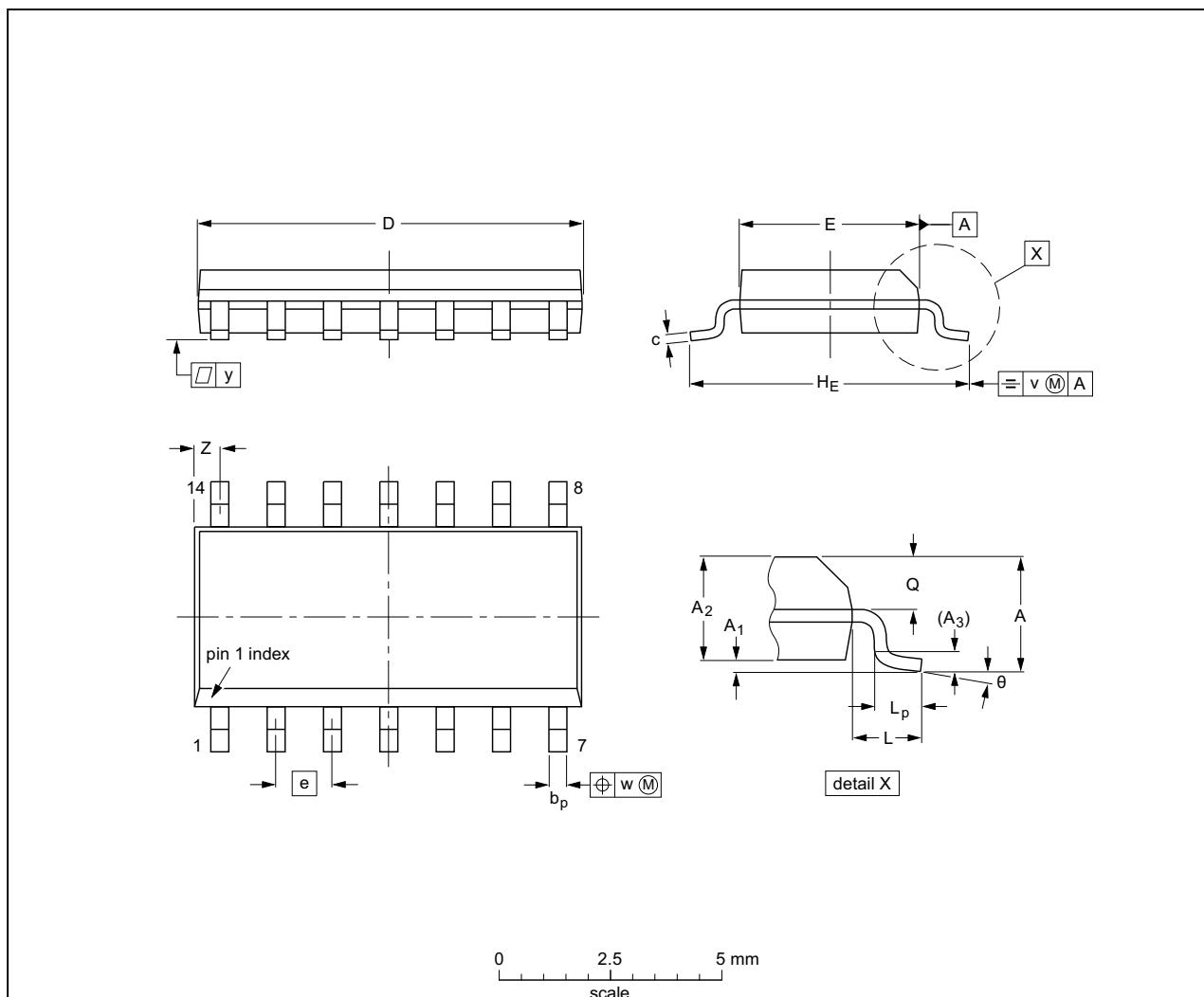


Fig 17. Test circuit for measuring crosstalk (between the switches)

## 13. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



### 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 0.10	0.25 1.25	1.45	0.25	0.49 0.36	0.25 0.19	8.75 8.55	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 0.004	0.010 0.049	0.057	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	0° 0°

### 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			
SOT108-1	076E06	MS-012				99-12-27 03-02-19

Fig 18. Package outline SOT108-1 (SO14)

SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1

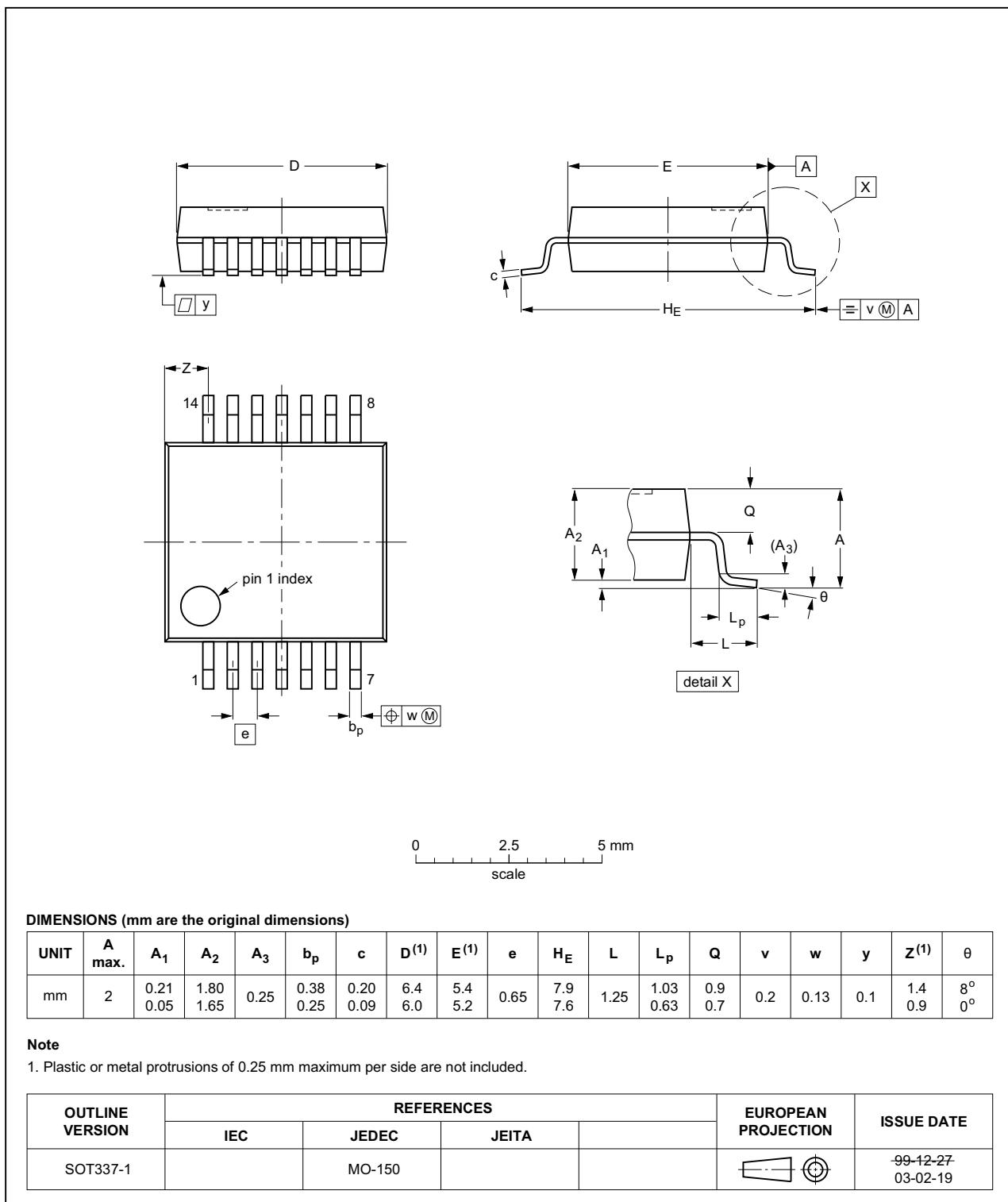


Fig 19. Package outline SOT337-1 (SSOP14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

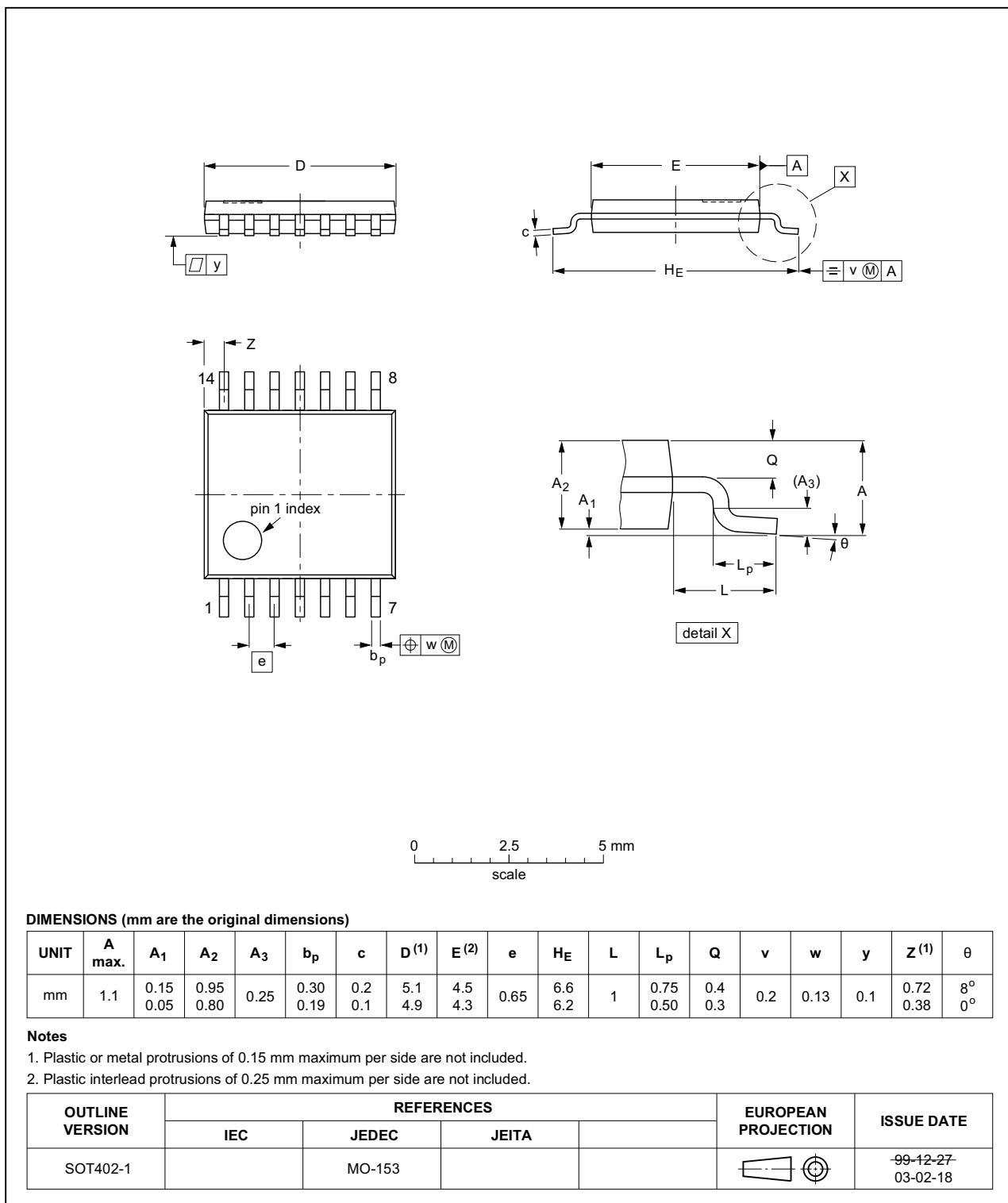


Fig 20. Package outline SOT402-1 (TSSOP14)

DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm

SOT762-1

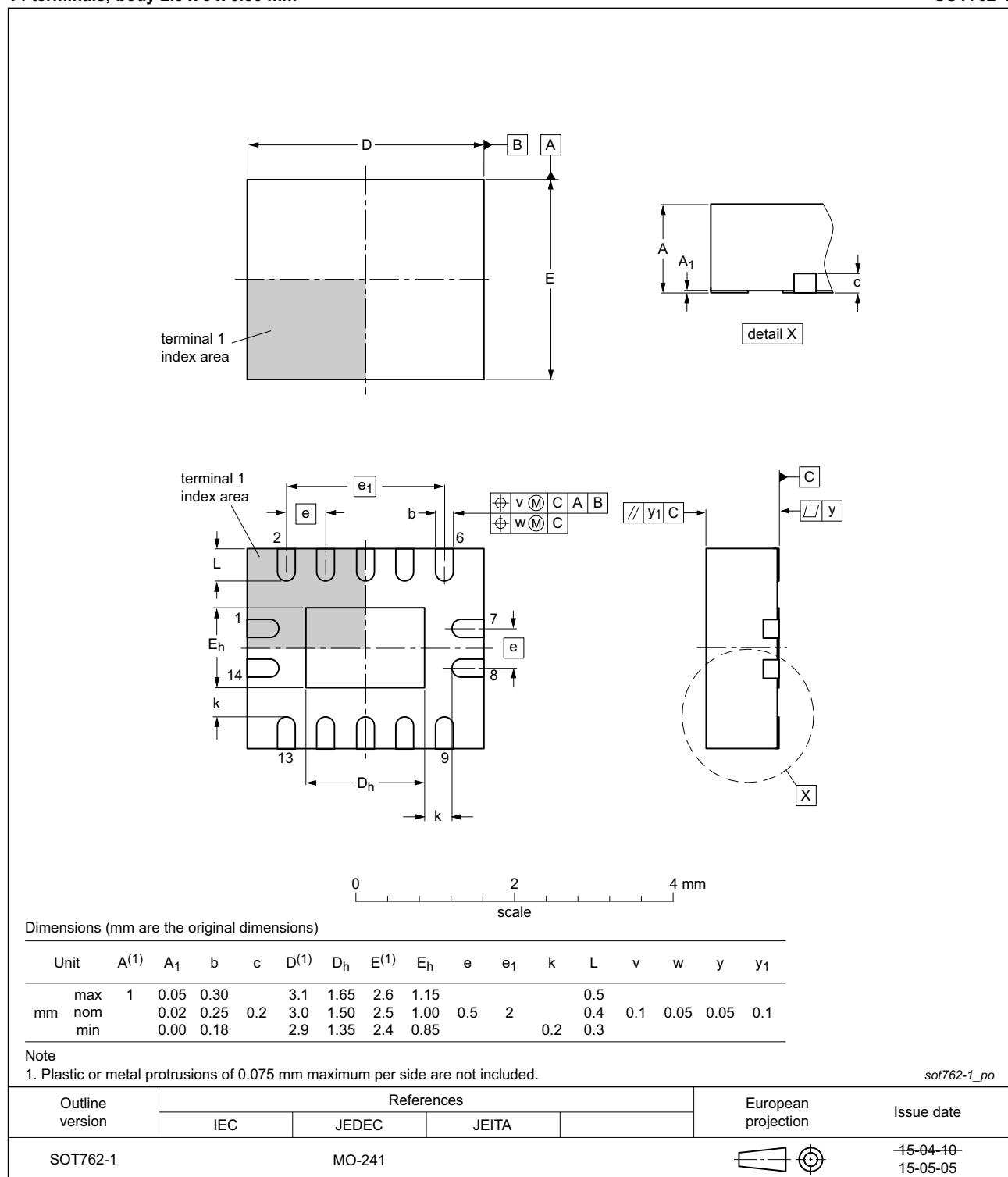


Fig 21. Package outline SOT762-1 (DHVQFN14)

## 14. Abbreviations

**Table 14. Abbreviations**

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

## 15. Revision history

**Table 15. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4066 v.8	20151203	Product data sheet	-	74HC_HCT4066 v.7
Modifications:	<ul style="list-style-type: none"> <li>Type numbers 74HC4066N and 74HCT4066N (SOT27-1) removed.</li> </ul>			
74HC_HCT4066 v.7	20130402	Product data sheet	-	74HC_HCT4066 v.6
Modifications:	<ul style="list-style-type: none"> <li>Descriptive title corrected (errata).</li> <li>New general description (errata).</li> </ul>			
74HC_HCT4066 v.6	20120718	Product data sheet	-	74HC_HCT4066 v.5
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74HC_HCT4066 v.5	20041111	Product data sheet	-	74HC_HCT4066 v.4
74HC_HCT4066 v.4	20030617	Product data sheet	-	74HC_HCT4066_CNV v.3
74HC_HCT4067_CNV v.3	19981110	Product data sheet	-	74HC_HCT4066_CNV v.2
74HC_HCT4066_CNV v.2	19981002	Product specification	-	-

## 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.

[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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