

# DATA SHEET

## **74HC4066; 74HCT4066** Quad bilateral switches

Product specification  
Supersedes data of 2003 Jun 17

2004 Nov 11

## Quad bilateral switches

## 74HC4066; 74HCT4066

## FEATURES

- Very 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.
- Complies with JEDEC standard no. 7A
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V.
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C.

## GENERAL DESCRIPTION

The 74HC4066 and 74HCT4066 are high-speed Si-gate CMOS devices and are pin compatible with the HEF4066B. They are specified in compliance with JEDEC standard no. 7A.

The 74HC4066 and 74HCT4066 have four independent analog switches. Each switch has two input/output pins (pins nY or nZ) and an active HIGH enable input pin (pin nE). When pin nE = LOW the belonging analog switch is turned off.

The 74HC4066 and 74HCT4066 are pin compatible with the 74HC4016 and 74HCT4016 but exhibit a much lower on-resistance. In addition, the on-resistance is relatively constant over the full input signal range.

## QUICK REFERENCE DATA

GND = 0 V;  $T_{amb} = 25$  °C;  $t_r = t_f = 6$  ns.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			74HC4066	74HCT4066	
$t_{PZH}/t_{PZL}$	turn-on time nE to $V_{os}$	$C_L = 15$ pF; $R_L = 1$ k $\Omega$ ; $V_{CC} = 5$ V	11	12	ns
$t_{PHZ}/t_{PLZ}$	turn-off time nE to $V_{os}$	$C_L = 15$ pF; $R_L = 1$ k $\Omega$ ; $V_{CC} = 5$ V	13	16	ns
$C_I$	input capacitance		3.5	3.5	pF
$C_{PD}$	power dissipation capacitance per switch	notes 1 and 2	11	12	pF
$C_S$	maximum switch capacitance		8	8	pF

## Notes

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

$C_S$  = maximum switch capacitance in pF;

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

N = number of inputs switching;

$\Sigma[(C_L + C_S) \times V_{CC}^2 \times f_o]$  = sum of the outputs.

2. For 74HC4066 the condition is  $V_I = \text{GND to } V_{CC}$ .  
For 74HCT4066 the condition is  $V_I = \text{GND to } V_{CC} - 1.5$  V.

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## FUNCTION TABLE

See note 1.

INPUT nE	SWITCH
L	off
H	on

### Note

- H = HIGH voltage level.  
L = LOW voltage level.

## ORDERING INFORMATION

TYPE NUMBER	PACKAGE				
	TEMPERATURE RANGE	PINS	PACKAGE	MATERIAL	CODE
74HC4066N	-40 °C to 125 °C	14	DIP14	plastic	SOT27-1
74HCT4066N	-40 °C to 125 °C	14	DIP14	plastic	SOT27-1
74HC4066D	-40 °C to 125 °C	14	SO14	plastic	SOT108-1
74HCT4066D	-40 °C to 125 °C	14	SO14	plastic	SOT108-1
74HC4066DB	-40 °C to 125 °C	14	SSOP14	plastic	SOT337-1
74HCT4066DB	-40 °C to 125 °C	14	SSOP14	plastic	SOT337-1
74HC4066PW	-40 °C to 125 °C	14	TSSOP14	plastic	SOT402-1
74HCT4066PW	-40 °C to 125 °C	14	TSSOP14	plastic	SOT402-1
74HC4066BQ	-40 °C to 125 °C	14	DHVQFN14	plastic	SOT762-1
74HCT4066BQ	-40 °C to 125 °C	14	DHVQFN14	plastic	SOT762-1

## PINNING

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

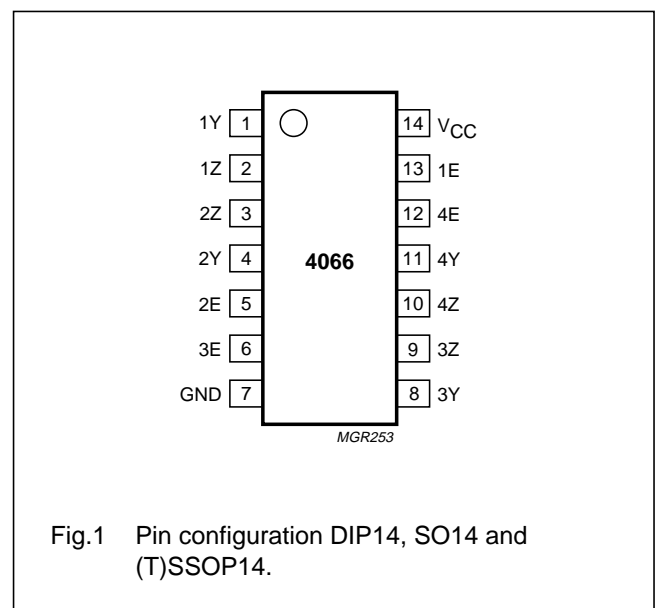
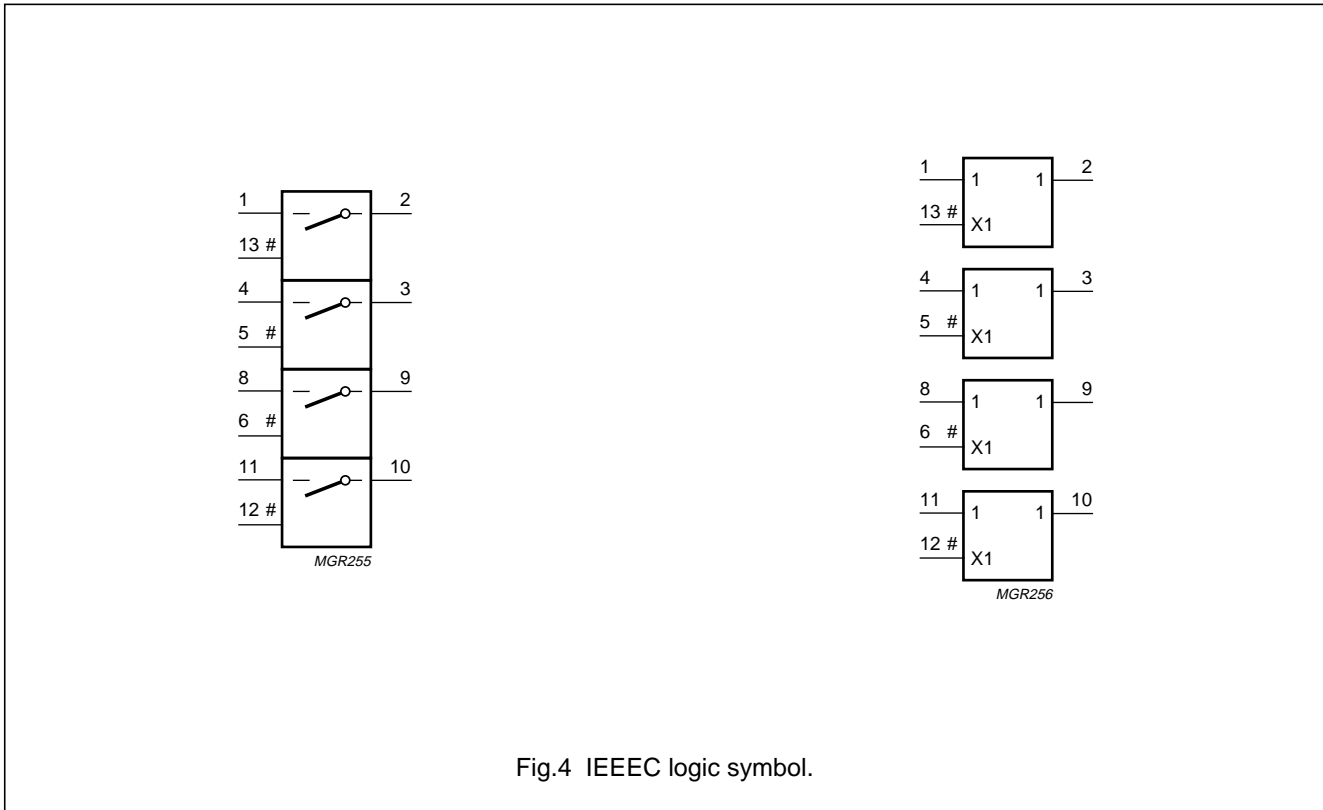
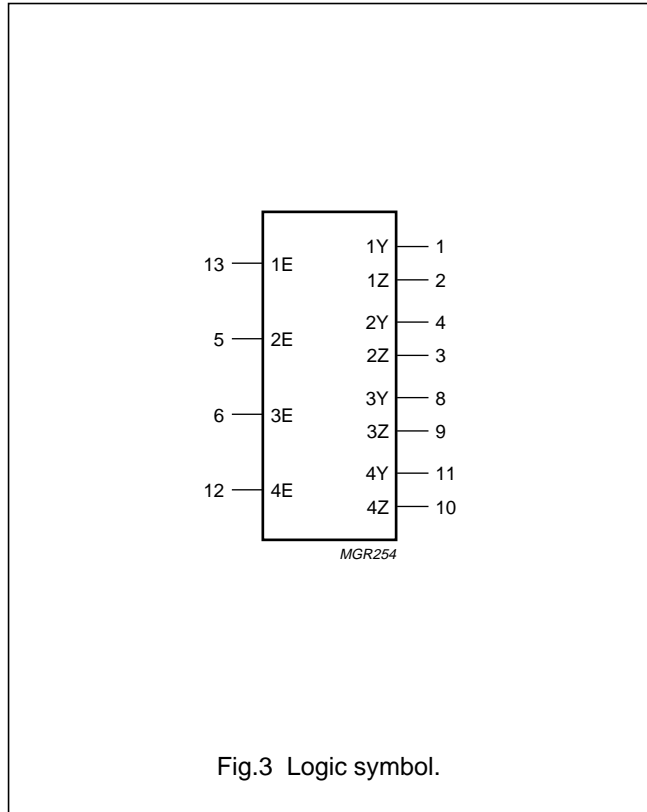
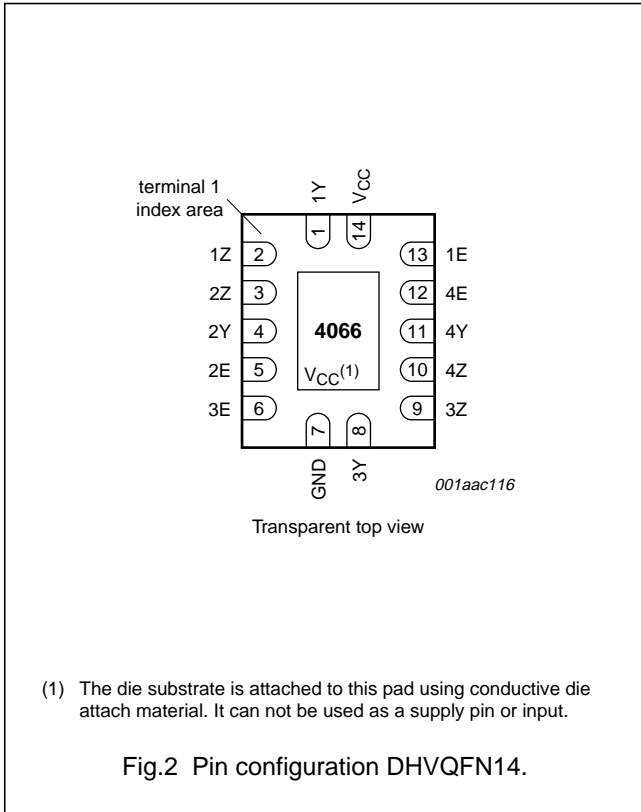


Fig.1 Pin configuration DIP14, SO14 and (T)SSOP14.

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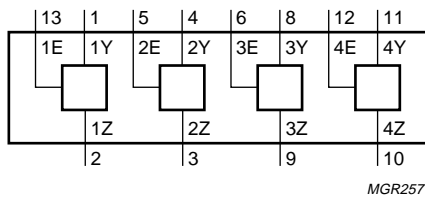


Fig.5 Functional diagram.

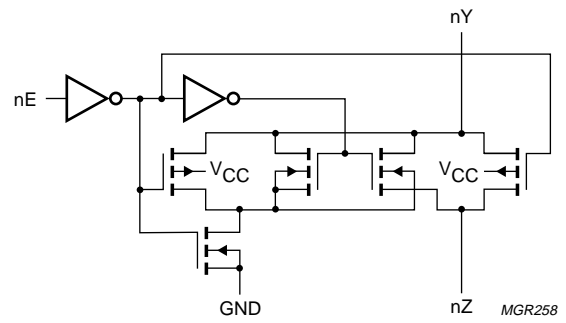


Fig.6 Schematic diagram (one switch).

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## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	74HC4066			74HCT4066			UNIT
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
$V_{CC}$	supply voltage		2.0	5.0	10.0	4.5	5.0	5.5	V
$V_I$	input voltage		GND	–	$V_{CC}$	GND	–	$V_{CC}$	V
$V_S$	switch voltage		GND	–	$V_{CC}$	GND	–	$V_{CC}$	V
$T_{amb}$	ambient temperature	see DC and AC characteristics per device	–40	+25	+85	–40	+25	+85	°C
			–40	–	+125	–40	–	+125	°C
$t_r, t_f$	input rise and fall times	$V_{CC} = 2.0$ V	–	6.0	1000	–	6.0	500	ns
		$V_{CC} = 4.5$ V	–	–	500	–	–	–	ns
		$V_{CC} = 6.0$ V	–	–	400	–	–	–	ns
		$V_{CC} = 10.0$ V	–	–	250	–	–	–	ns

## 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	+11.0	V
$I_{IK}$	input diode current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	–	±20	mA
$I_{SK}$	switch diode current	$V_S < -0.5$ V or $V_S > V_{CC} + 0.5$ V	–	±20	mA
$I_S$	switch current	$-0.5$ V < $V_O < V_{CC} + 0.5$ V; note 1	–	±25	mA
$I_{CC}, I_{GND}$	$V_{CC}$ or GND current		–	±50	mA
$T_{stg}$	storage temperature		–65	+150	°C
$P_{tot}$	power dissipation	$T_{amb} = -40$ °C to +125 °C; note 2	–	500	mW
$P_S$	power dissipation per switch		–	100	mW

## Notes

- To avoid drawing  $V_{CC}$  current out of pin nZ, when switch current flows in pin nY, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into pin nZ, no  $V_{CC}$  current will flow out of pin nY. In this case there is no limit for the voltage drop across the switch, but the voltages at pins nY and nZ may not exceed  $V_{CC}$  or GND.
- For DIP14 packages: above 70 °C derate linearly with 12 mW/K.  
For SO14 packages: above 70 °C derate linearly with 8 mW/K.  
For SSOP14 and TSSOP16 packages: above 60 °C derate linearly with 5.5 mW/K.  
For DHVQFN14 packages: above 60 °C derate linearly with 4.5 mW/K.

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## DC CHARACTERISTICS

## Family 74HC4066

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	$V_{CC}$ (V)				
$T_{amb} = -40\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$ ; note 1							
$V_{IH}$	HIGH-level input voltage		2.0	1.5	1.2	–	V
			4.5	3.15	2.4	–	V
			6.0	4.2	3.2	–	V
			9.0	6.3	4.7	–	V
$V_{IL}$	LOW-level input voltage		2.0	–	0.8	0.50	V
			4.5	–	2.1	1.35	V
			6.0	–	2.8	1.80	V
			9.0	–	4.3	2.70	V
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND	6.0	–	–	$\pm 1.0$	$\mu\text{A}$
			10.0	–	–	$\pm 2.0$	$\mu\text{A}$
$I_{S(OFF)}$	analog switch current OFF-state	per channel; $V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.7	10.0	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{S(ON)}$	analog switch current ON-state	$V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.8	10.0	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND	6.0	–	–	20.0	$\mu\text{A}$
			10.0	–	–	40.0	$\mu\text{A}$

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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		2.0	1.5	-	-	V
			4.5	3.15	-	-	V
			6.0	4.2	-	-	V
			9.0	6.3	-	-	V
V <sub>IL</sub>	LOW-level input voltage		2.0	-	-	0.50	V
			4.5	-	-	1.35	V
			6.0	-	-	1.80	V
			9.0	-	-	2.70	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND	6.0	-	-	±1.0	μA
			10.0	-	-	±2.0	μA
I <sub>S(OFF)</sub>	analog switch current OFF-state	per channel; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>S</sub> = V <sub>CC</sub> - GND; see Fig.7	10.0	-	-	±1.0	μA
I <sub>S(ON)</sub>	analog switch current ON-state	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>S</sub> = V <sub>CC</sub> - GND; see Fig.8	10.0	-	-	±1.0	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = GND or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or GND	6.0	-	-	40.0	μA
			10.0	-	-	80.0	μA

**Note**

1. All typical values are measured at T<sub>amb</sub> = 25 °C.



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**Family 74HCT4066**

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	$V_{CC}$ (V)				
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math>; note 1</b>							
$V_{IH}$	HIGH-level input voltage		4.5 to 5.5	2.0	1.6	–	V
$V_{IL}$	LOW-level input voltage		4.5 to 5.5	–	1.2	0.8	V
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND	5.5	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	analog switch current OFF-state	per channel; $V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.7	5.5	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{S(ON)}$	analog switch current ON-state	$V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.8	5.5	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND	4.5 to 5.5	–	–	20.0	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current per input	$V_I = V_{CC} - 2.1\text{ V}$ ; other inputs at $V_{CC}$ or GND	4.5 to 5.5	–	100	450	$\mu\text{A}$
<b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b>							
$V_{IH}$	HIGH-level input voltage		4.5 to 5.5	2.0	–	–	V
$V_{IL}$	LOW-level input voltage		4.5 to 5.5	–	–	0.8	V
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND	5.5	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	analog switch current OFF-state	per channel; $V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.7	10.0	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{S(ON)}$	analog switch current ON-state	$V_I = V_{IH}$ or $V_{IL}$ ; $V_S = V_{CC} - \text{GND}$ ; see Fig.8	10.0	–	–	$\pm 1.0$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND	4.5 to 5.5	–	–	40.0	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current per input	$V_I = V_{CC} - 2.1\text{ V}$ ; other inputs at $V_{CC}$ or GND	4.5 to 5.5	–	–	490	$\mu\text{A}$

**Note**

1. All typical values are measured at  $T_{amb} = 25\text{ °C}$ .

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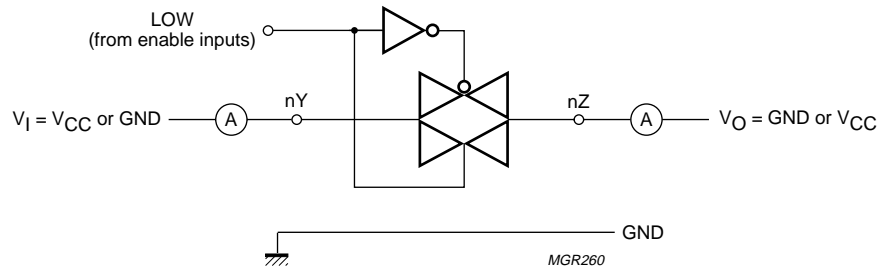


Fig.7 Test circuit for measuring OFF-state current.

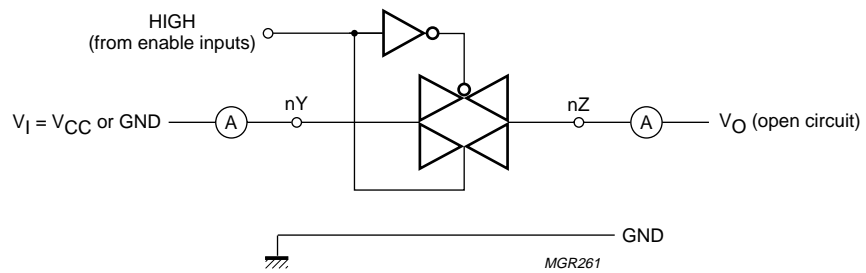


Fig.8 Test circuit for measuring ON-state current.

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**Resistance  $R_{ON}$  for 74HC4066 and 74HCT4066**

For 74HC4066:  $V_{CC} = 2.0, 4.5, 6.0$  and  $9.0$  V; for 74HCT4066:  $V_{CC} = 4.5$  V; note 1;  $V_{is}$  is the input voltage at pins nY or nZ, whichever is assigned as an input; see Fig.9.

SYMBOL	PARAMETER	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT	
		OTHER	$I_S$ ( $\mu$ A)	$V_{CC}$ (V)					
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C; note 2</b>									
$R_{ON(peak)}$	ON-resistance (peak)	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = V_{CC}$ to GND	100	2.0	–	–	–	$\Omega$	
			1000	4.5	–	54	118	$\Omega$	
				6.0	–	42	105	$\Omega$	
				9.0	–	32	88	$\Omega$	
$R_{ON(rail)}$	ON-resistance (rail)	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = GND$	100	2.0	–	80	–	$\Omega$	
			1000	4.5	–	35	95	$\Omega$	
				6.0	–	27	82	$\Omega$	
				9.0	–	20	70	$\Omega$	
			$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = V_{CC}$	100	2.0	–	100	–	$\Omega$
				1000	4.5	–	42	106	$\Omega$
					6.0	–	35	94	$\Omega$
					9.0	–	27	78	$\Omega$
$\Delta R_{ON}$	maximum variation of ON-resistance between any two channels	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = V_{CC}$ to GND	–	2.0	–	–	–	$\Omega$	
			4.5	–	5	–	$\Omega$		
			6.0	–	4	–	$\Omega$		
			9.0	–	3	–	$\Omega$		
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>									
$R_{ON(peak)}$	ON-resistance (peak)	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = V_{CC}$ to GND	100	2.0	–	–	–	$\Omega$	
			1000	4.5	–	–	142	$\Omega$	
				6.0	–	–	126	$\Omega$	
				9.0	–	–	105	$\Omega$	
$R_{ON(rail)}$	ON-resistance (rail)	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = GND$	100	2.0	–	–	–	$\Omega$	
			1000	4.5	–	–	115	$\Omega$	
				6.0	–	–	100	$\Omega$	
				9.0	–	–	85	$\Omega$	
			$V_I = V_{IH}$ or $V_{IL}$ ; $V_{is} = V_{CC}$	100	2.0	–	–	–	$\Omega$
				1000	4.5	–	–	128	$\Omega$
					6.0	–	–	113	$\Omega$
					9.0	–	–	95	$\Omega$

**Notes**

- At supply voltages approaching 2 V, the analog ON-resistance switch becomes extremely non-linear. Therefore, it is recommended that these devices are being used to transmit digital signals only, when using these supply voltages.
- All typical values are measured at  $T_{amb} = 25$  °C.

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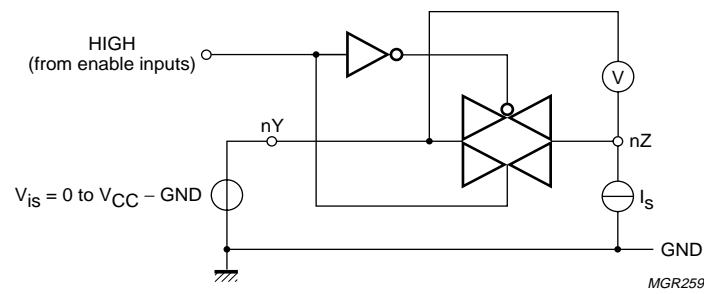
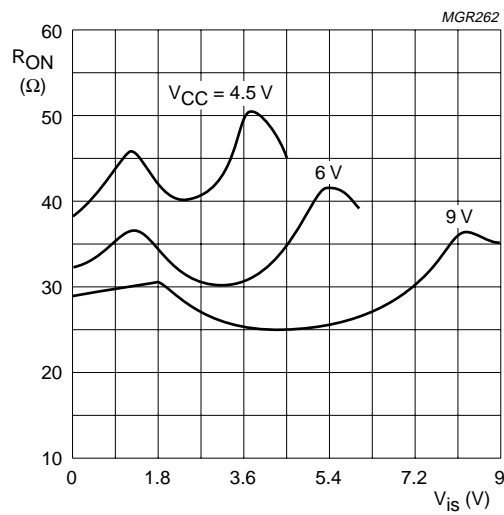


Fig.9 Test circuit for measuring ON-resistance ( $R_{ON}$ ).



$V_{is} = 0$  V to  $V_{CC}$ .

Fig.10 Typical ON-resistance ( $R_{ON}$ ) as a function of input voltage ( $V_{is}$ ).

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## AC CHARACTERISTICS

## Type 74HC4066

GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF;  $V_{is}$  is the input voltage at pins nY or nZ, whichever is assigned as an input;  $V_{os}$  is the output voltage at pins nY or nZ, whichever is assigned as an output.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	$V_{CC}$ (V)				
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C; note 1</b>							
$t_{PHL}/t_{PLH}$	propagation delay $V_{is}$ to $V_{os}$	$R_L = \infty$ ; see Fig.19	2.0	–	8	75	ns
			4.5	–	3	15	ns
			6.0	–	2	13	ns
			9.0	–	2	10	ns
$t_{PZH}/t_{PZL}$	turn-on time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	2.0	–	36	125	ns
			4.5	–	13	25	ns
			6.0	–	10	21	ns
			9.0	–	8	16	ns
$t_{PHZ}/t_{PLZ}$	turn-off time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	2.0	–	44	190	ns
			4.5	–	16	38	ns
			6.0	–	13	33	ns
			9.0	–	16	26	ns
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>							
$t_{PHL}/t_{PLH}$	propagation delay $V_{is}$ to $V_{os}$	$R_L = \infty$ ; see Fig.19	2.0	–	–	90	ns
			4.5	–	–	18	ns
			6.0	–	–	15	ns
			9.0	–	–	12	ns
$t_{PZH}/t_{PZL}$	turn-on time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	2.0	–	–	150	ns
			4.5	–	–	30	ns
			6.0	–	–	26	ns
			9.0	–	–	20	ns
$t_{PHZ}/t_{PLZ}$	turn-off time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	2.0	–	–	225	ns
			4.5	–	–	45	ns
			6.0	–	–	38	ns
			9.0	–	–	30	ns

## Note

1. All typical values are measured at  $T_{amb} = 25$  °C.

## Quad bilateral switches

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**Type 74HCT4066**

GND = 0 V;  $t_r = t_f = 6$  ns;  $C_L = 50$  pF;  $V_{is}$  is the input voltage at pins nY or nZ, whichever is assigned as an input;  $V_{os}$  is the output voltage at pins nY or nZ, whichever is assigned as an output.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	$V_{CC}$ (V)				
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C; note 1</b>							
$t_{PHL}/t_{PLH}$	propagation delay $V_{is}$ to $V_{os}$	$R_L = \infty$ ; see Fig.19	4.5	–	3	15	ns
$t_{PZH}/t_{PZL}$	turn-on time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	4.5	–	12	30	ns
$t_{PHZ}/t_{PLZ}$	turn-off time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	4.5	–	20	44	ns
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>							
$t_{PHL}/t_{PLH}$	propagation delay $V_{is}$ to $V_{os}$	$R_L = \infty$ ; see Fig.19	4.5	–	–	18	ns
$t_{PZH}/t_{PZL}$	turn-on time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	4.5	–	–	36	ns
$t_{PHZ}/t_{PLZ}$	turn-off time nE to $V_{os}$	$R_L = 1$ k $\Omega$ ; see Figs 20 and 21	4.5	–	–	53	ns

**Note**

1. All typical values are measured at  $T_{amb} = 25$  °C.

**74HC4066 and 74HCT4066**

At recommended conditions and typical values; GND = 0 V;  $t_r = t_f = 6$  ns;  $V_{is}$  is the input voltage at pins nY or nZ, whichever is assigned as an input;  $V_{os}$  is the output voltage at pins nY or nZ, whichever is assigned as an output.

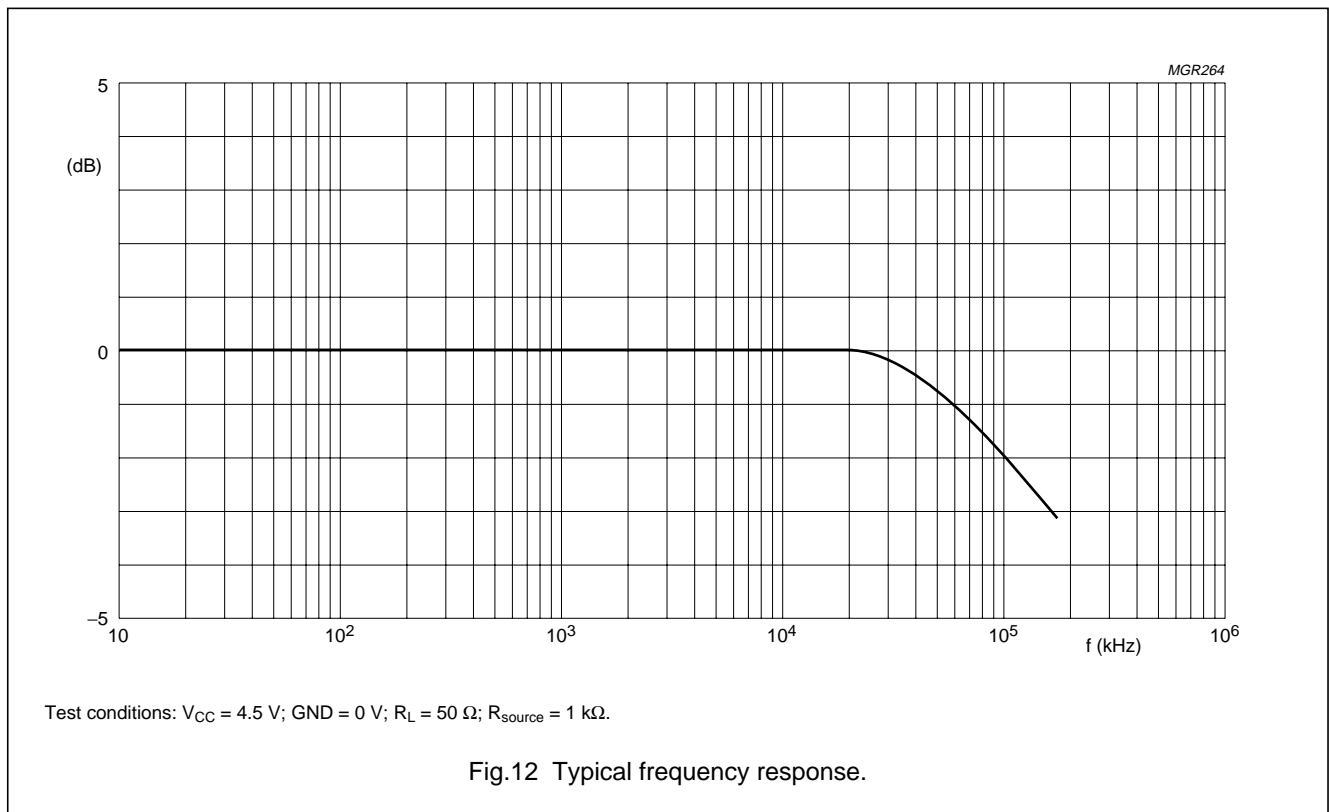
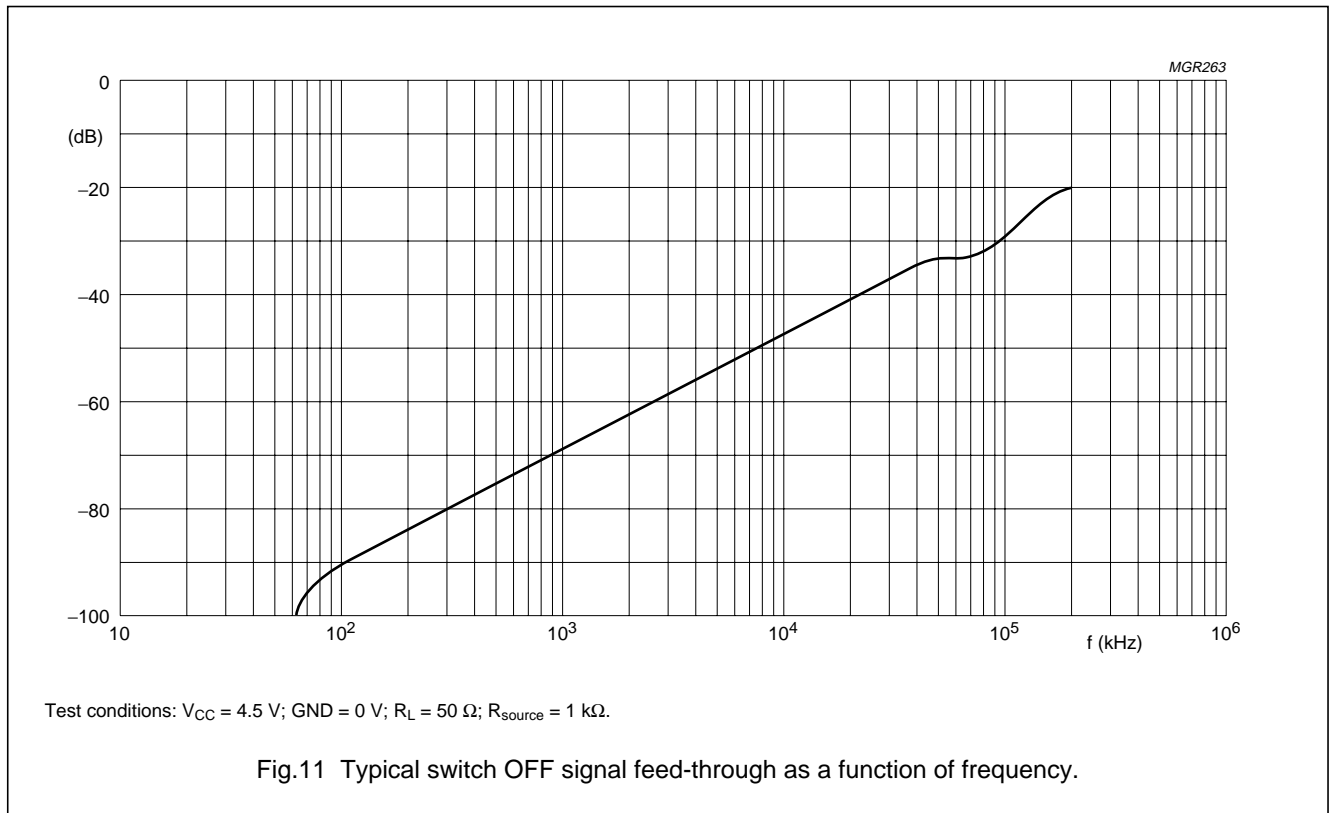
SYMBOL	PARAMETER	CONDITIONS			TYP.	UNIT
		OTHER	$V_{is(p-p)}$ (V)	$V_{CC}$ (V)		
$d_{sin}$	sine wave distortion	$f = 1$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; see Fig.17	4.0	4.5	0.04	%
			8.0	9.0	0.02	%
		$f = 10$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; see Fig.17	4.0	4.5	0.12	%
			8.0	9.0	0.06	%
$\alpha_{OFF(feethr)}$	switch OFF signal feed-through	$R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f = 1$ MHz; see Figs 11 and 18	note 1	4.5	–50	dB
				9.0	–50	dB
$\alpha_{ct(s)}$	crosstalk between any two switches	$R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f = 1$ MHz; see Fig.13	note 1	4.5	–60	dB
				9.0	–60	dB
$V_{ct(p-p)}$	crosstalk voltage between any input to any switch (peak-to-peak value)	$R_L = 600$ $\Omega$ ; $C_L = 50$ pF; $f = 1$ MHz; see Fig.15 (nE, square wave between $V_{CC}$ and GND, $t_r = t_f = 6$ ns)	–	4.5	110	mV
				9.0	220	mV
$f_{max}$	minimum frequency response (–3 dB)	$R_L = 50$ $\Omega$ ; $C_L = 10$ pF; see Figs 12 and 16	note 2	4.5	180	MHz
				9.0	200	MHz
$C_S$	maximum switch capacitance		–	–	8	pF

**Notes**

- Adjust input voltage  $V_{is}$  is 0 dBm level (0 dBm = 1 mW into 600  $\Omega$ ).
- Adjust input voltage  $V_{is}$  is 0 dBm level at  $V_{os}$  for 1 MHz (0 dBm = 1 mW into 50  $\Omega$ ).

Quad bilateral switches

74HC4066; 74HCT4066



Quad bilateral switches

74HC4066; 74HCT4066

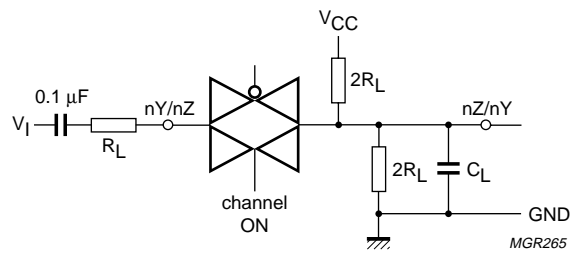


Fig.13 Test circuit for measuring crosstalk between any two switches; channels ON condition.

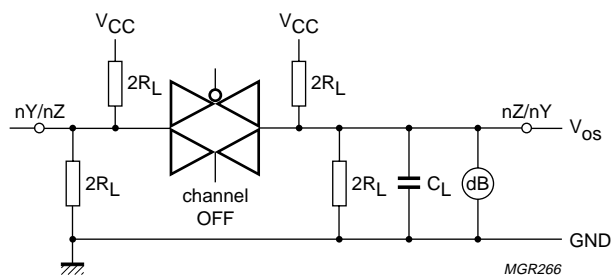


Fig.14 Test circuit for measuring crosstalk between any two switches; channels OFF condition.



Quad bilateral switches

74HC4066; 74HCT4066

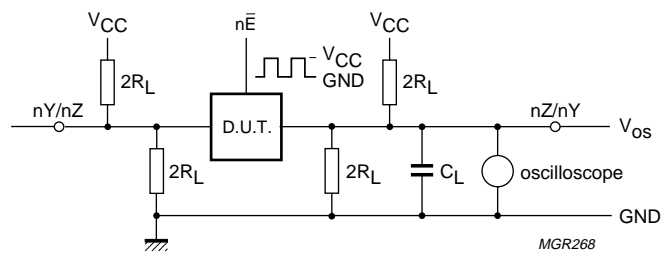
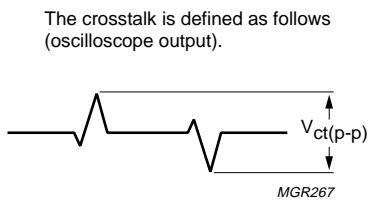
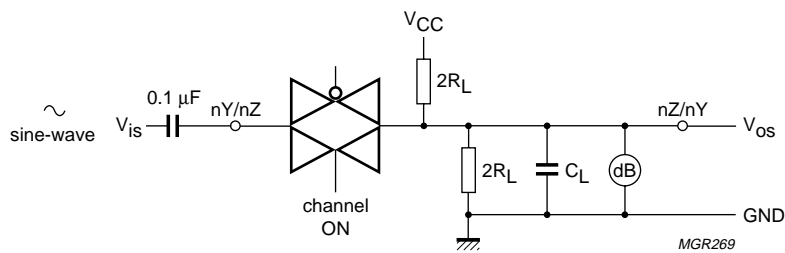


Fig.15 Test circuit for measuring crosstalk between control and any switch.



Adjust input voltage to obtain 0 dB at  $V_{os}$  when  $f_i = 1$  MHz. After set-up, the frequency of  $f_i$  is increased to obtain a reading of -3 dB at  $V_{os}$ .

Fig.16 Test circuit for measuring minimum frequency response.

Quad bilateral switches

74HC4066; 74HCT4066

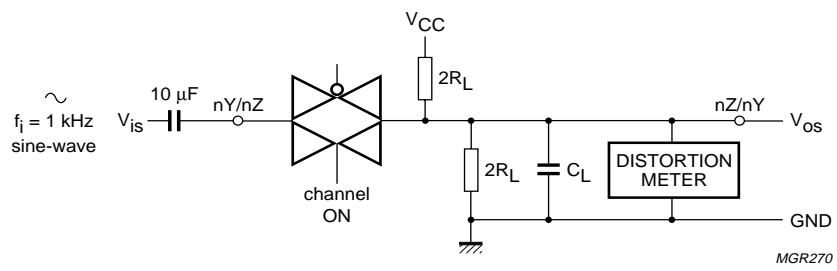


Fig.17 Test circuit for measuring sine wave distortion.

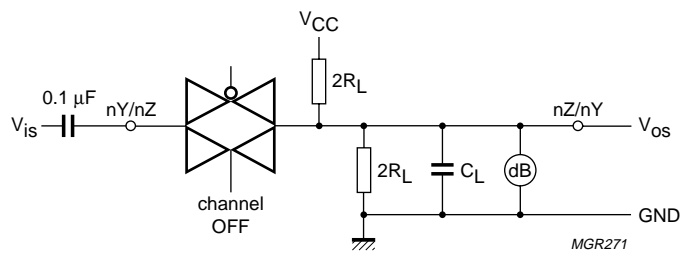


Fig.18 Test circuit for measuring switch OFF signal feed-through.

Quad bilateral switches

74HC4066; 74HCT4066

AC WAVEFORMS

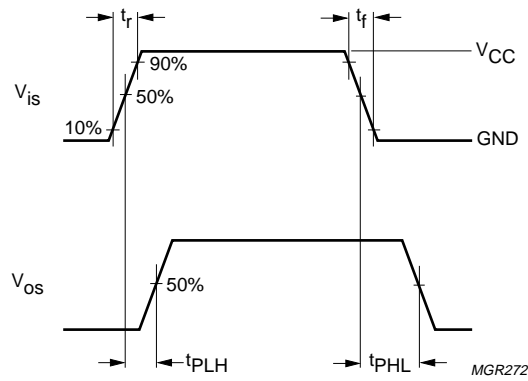
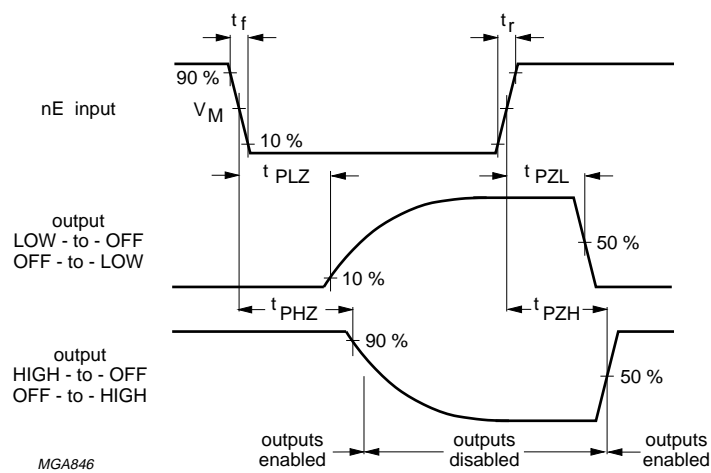


Fig.19 Waveforms showing the input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays.



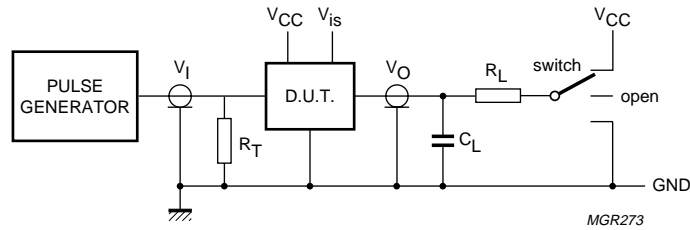
74HC4066:  $V_M = 50\%$ ;  $V_I = \text{GND to } V_{CC}$ .  
 74HCT4066:  $V_M = 1.3 \text{ V}$ ;  $V_I = \text{GND to } 3 \text{ V}$ .

Fig.20 Waveforms showing the turn-on and turn-off times.

Quad bilateral switches

74HC4066; 74HCT4066

TEST CIRCUIT AND WAVEFORMS



TEST	SWITCH	V <sub>is</sub>
t <sub>PZH</sub>	GND	V <sub>CC</sub>
t <sub>PZL</sub>	V <sub>CC</sub>	GND
t <sub>PHZ</sub>	GND	V <sub>CC</sub>
t <sub>PLZ</sub>	V <sub>CC</sub>	GND
other	open	pulse

Definitions for test circuit:

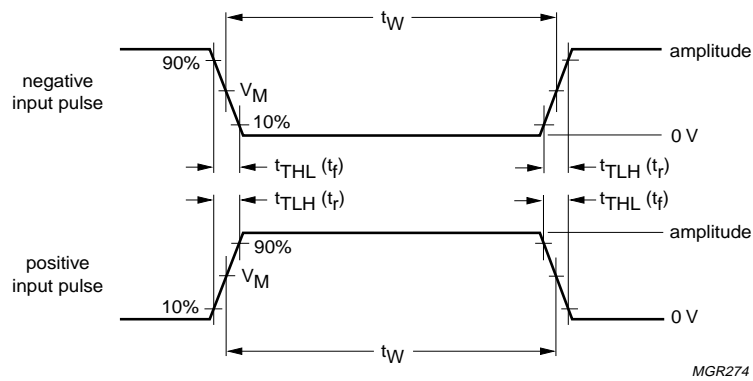
R<sub>L</sub> = Load resistance.

C<sub>L</sub> = Load capacitance including jig and probe capacitance.

R<sub>T</sub> = Termination resistance should be equal to the output impedance Z<sub>O</sub> of the pulse generator.

t<sub>r</sub> = 6 ns; when measuring f<sub>max</sub>, there is no constraint to t<sub>r</sub> and t<sub>f</sub> with 50 % duty factor.

Fig.21 Test circuit for measuring AC performance.



FAMILY	AMPLITUDE	V <sub>M</sub>	t <sub>r</sub> and t <sub>f</sub>	
			f <sub>max</sub> ; PULSE WIDTH	OTHER
74HC4066	V <sub>CC</sub>	50 %	<2 ns	6 ns
74HCT4066	3.0 V	1.3 V	<2 ns	6 ns

Fig.22 Input pulse definitions.

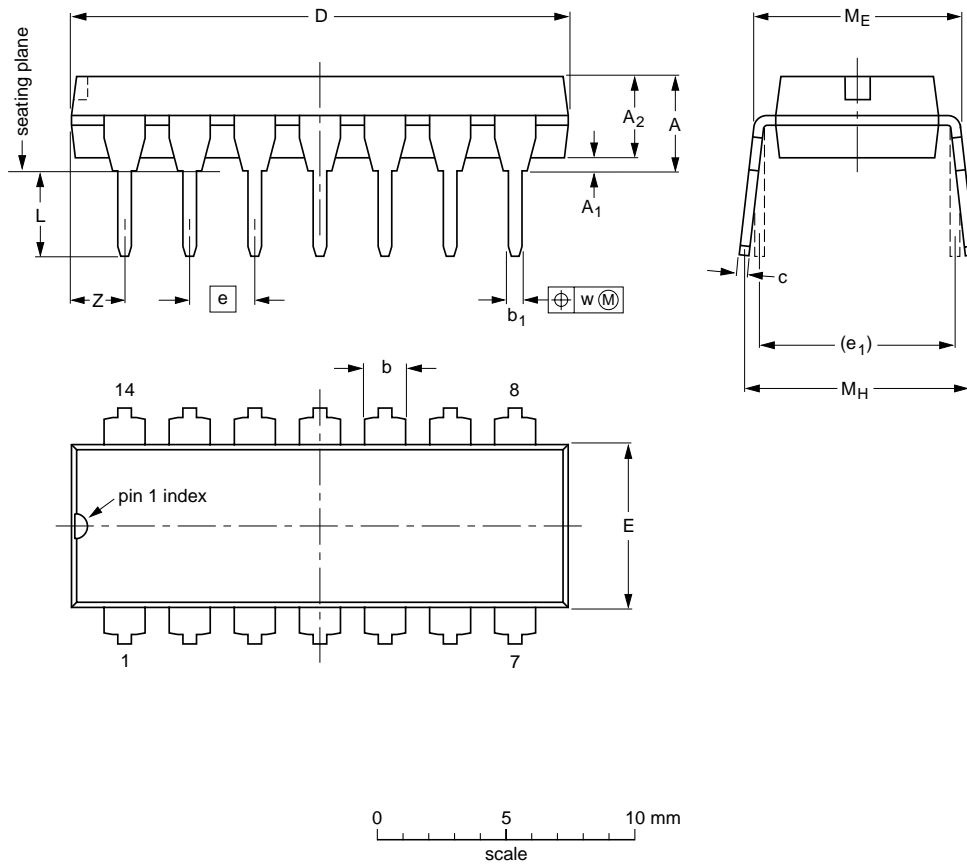
Quad bilateral switches

74HC4066; 74HCT4066

PACKAGE OUTLINES

DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



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

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.02	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

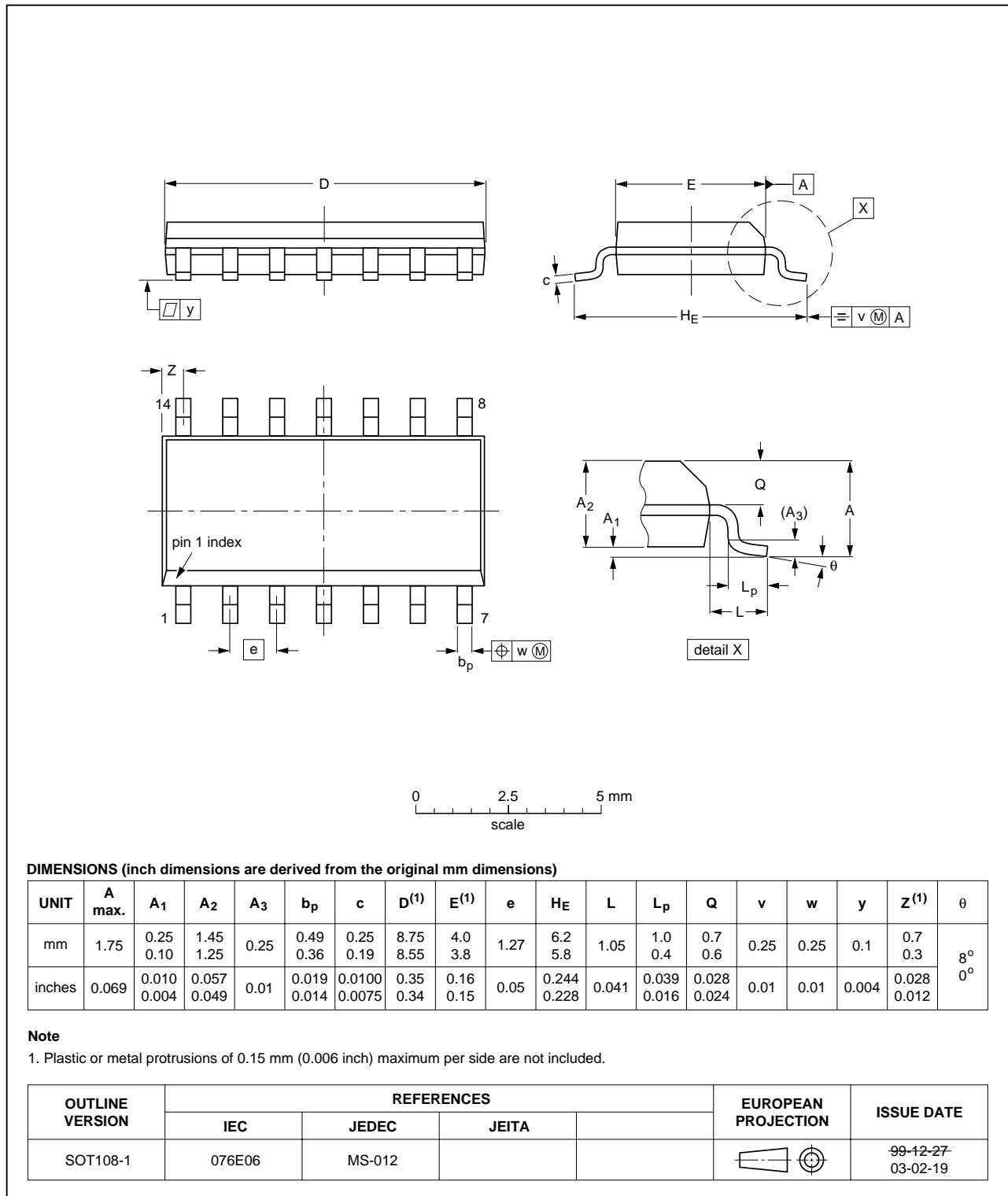
OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT27-1	050G04	MO-001	SC-501-14		99-12-27 03-02-13

Quad bilateral switches

74HC4066; 74HCT4066

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

SOT108-1

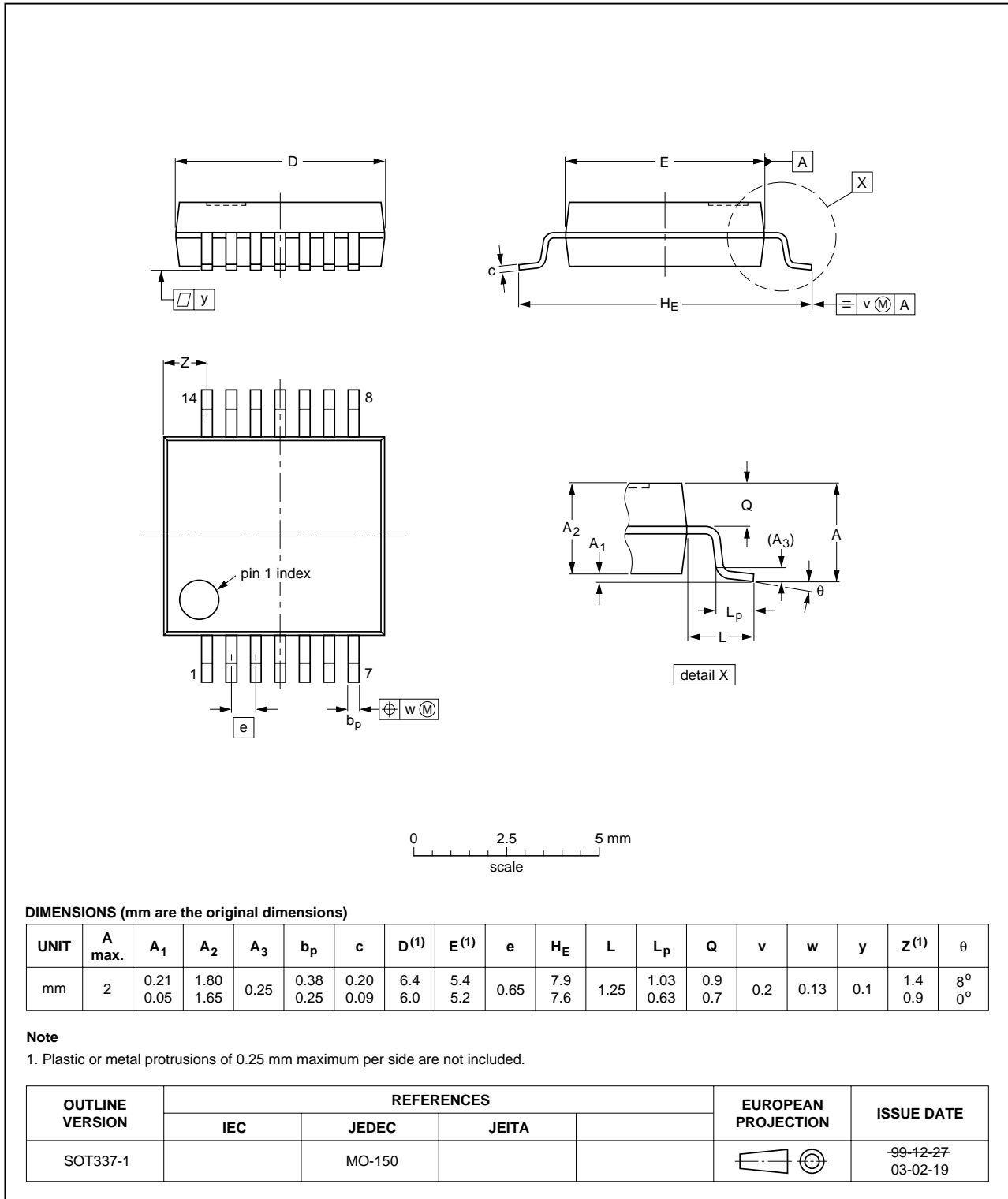


Quad bilateral switches

74HC4066; 74HCT4066

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

SOT337-1

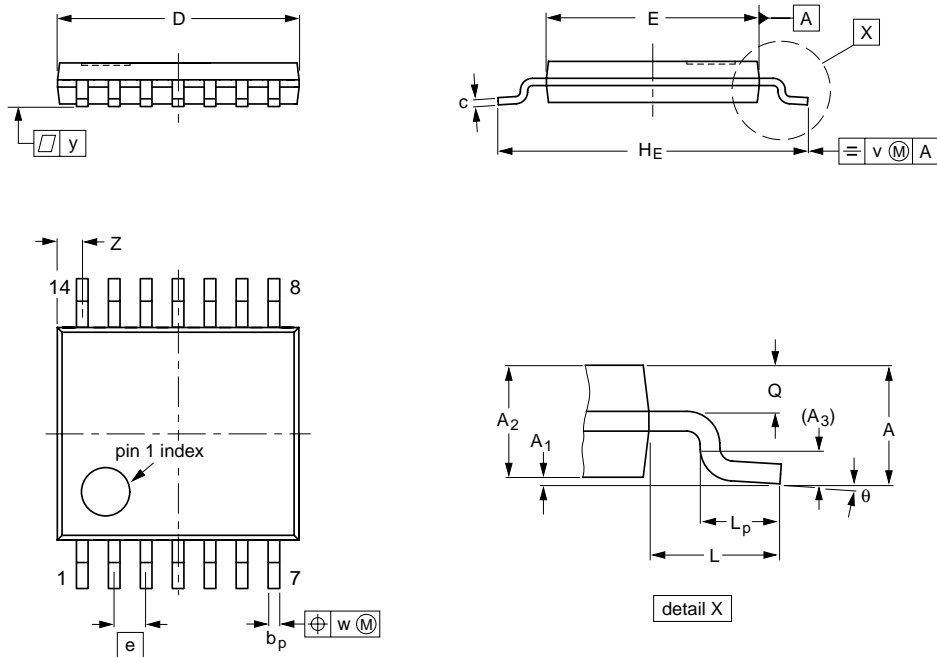


Quad bilateral switches

74HC4066; 74HCT4066

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

SOT402-1



**DIMENSIONS (mm are the original 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>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°

**Notes**

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.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT402-1		MO-153			99-12-27 03-02-18

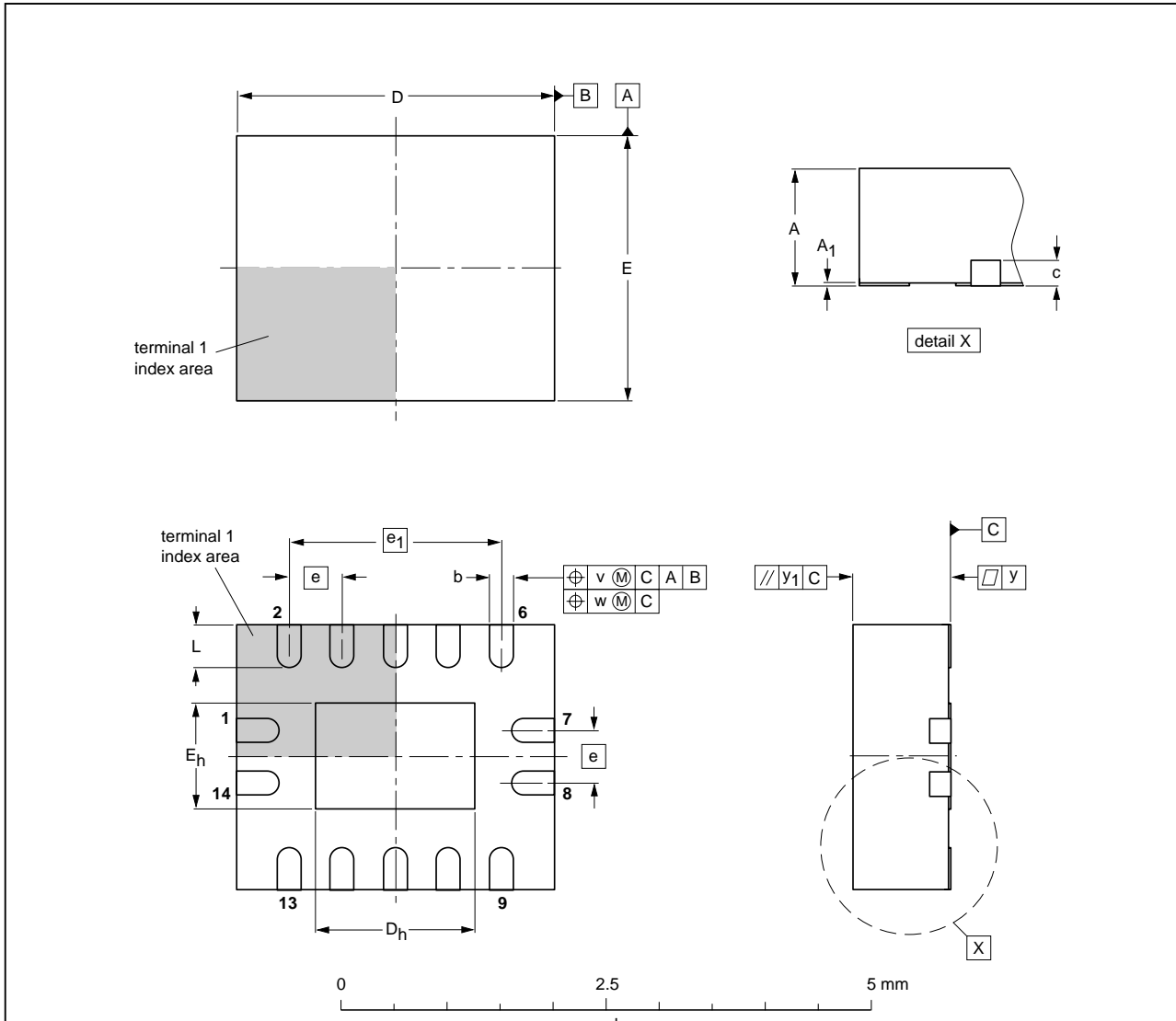


Quad bilateral switches

74HC4066; 74HCT4066

**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**



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

UNIT	A <sup>(1)</sup> max.	A <sub>1</sub>	b	c	D <sup>(1)</sup>	D <sub>h</sub>	E <sup>(1)</sup>	E <sub>h</sub>	e	e <sub>1</sub>	L	v	w	y	y <sub>1</sub>
mm	1	0.05 0.00	0.30 0.18	0.2	3.1 2.9	1.65 1.35	2.6 2.4	1.15 0.85	0.5	2	0.5 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		
SOT762-1	---	MO-241	---		02-10-17 03-01-27

## Quad bilateral switches

74HC4066; 74HCT4066

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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