

# 74HC4067; 74HCT4067

16-channel analog multiplexer/demultiplexer

Rev. 5 — 13 December 2011

Product data sheet

## 1. General description

The 74HC4067; 74HCT4067 is a high-speed Si-gate CMOS device and is pin compatible with the HEF4067B. The device is specified in compliance with JEDEC standard no. 7A.

The 74HC4067; 74HCT4067 is a 16-channel analog multiplexer/demultiplexer with four address inputs (S0 to S3), an active-LOW enable input ( $\bar{E}$ ), sixteen independent inputs/outputs (Y0 to Y15) and a common input/output (Z).

The 74HC4067; 74HCT4067 contains sixteen bidirectional analog switches, each with one side connected to an independent input/output (Y0 to Y15) and the other side connected to a common input/output (Z).

With pin  $\bar{E}$  = LOW, one of the sixteen switches is selected by pins S0 to S3 (low impedance ON-state). All unselected switches are in the high-impedance OFF-state. With pin  $\bar{E}$  = HIGH, all switches are in the high-impedance OFF-state, independent of pins S0 to S3.

The analog inputs/outputs (Y0 to Y15, and Z) can swing between  $V_{CC}$  as a positive limit and GND as a negative limit.  $V_{CC}$  to GND may not exceed 10 V.

## 2. Features and benefits

- Low ON resistance:
  - ◆ 80  $\Omega$  (typical) at  $V_{CC} = 4.5$  V
  - ◆ 70  $\Omega$  (typical) at  $V_{CC} = 6.0$  V
  - ◆ 60  $\Omega$  (typical) at  $V_{CC} = 9.0$  V
- Typical 'break before make' built-in

## 3. Applications

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



## 4. Ordering information

**Table 1. Ordering information**

Type number	Package				Version
	Temperature range	Name	Description		
<b>74HC4067</b>					
74HC4067N	−40 °C to +125 °C	DIP24	plastic dual in-line package; 24 leads (600 mil); reverse bending		SOT101-1
74HC4067D	−40 °C to +125 °C	SO24	plastic small outline package; 24 leads; body width 7.5 mm		SOT137-1
74HC4067DB	−40 °C to +125 °C	SSOP24	plastic shrink small outline package; 24 leads; body width 5.3 mm		SOT340-1
74HC4067PW	−40 °C to +125 °C	TSSOP24	plastic thin shrink small outline package; 24 leads; body width 4.4 mm		SOT355-1
74HC4067BQ	−40 °C to +125 °C	DHVQFN24	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3.5 × 5.5 × 0.85 mm		SOT815-1
<b>74HCT4067</b>					
74HCT4067N	−40 °C to +125 °C	DIP24	plastic dual in-line package; 24 leads (600 mil); reverse bending		SOT101-1
74HCT4067D	−40 °C to +125 °C	SO24	plastic small outline package; 24 leads; body width 7.5 mm		SOT137-1
74HCT4067DB	−40 °C to +125 °C	SSOP24	plastic shrink small outline package; 24 leads; body width 5.3 mm		SOT340-1
74HCT4067PW	−40 °C to +125 °C	TSSOP24	plastic thin shrink small outline package; 24 leads; body width 4.4 mm		SOT355-1
74HCT4067BQ	−40 °C to +125 °C	DHVQFN24	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3.5 × 5.5 × 0.85 mm		SOT815-1

## 5. Functional diagram

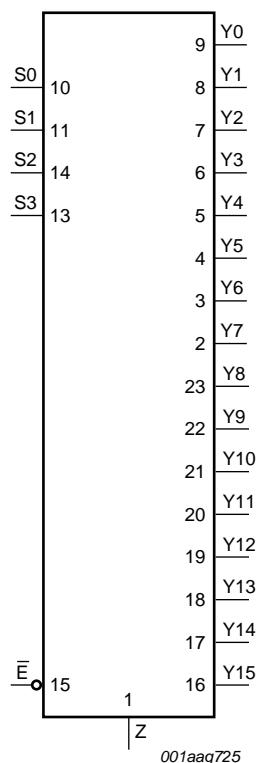


Fig 1. Logic symbol

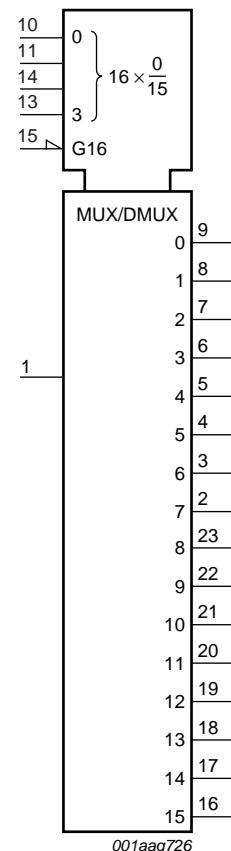


Fig 2. IEC logic symbol

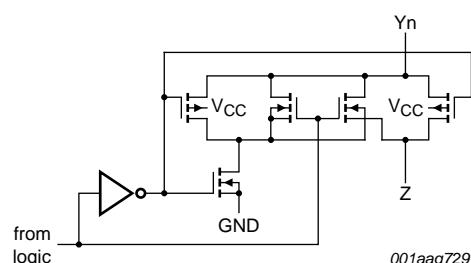


Fig 3. Schematic diagram (one switch)

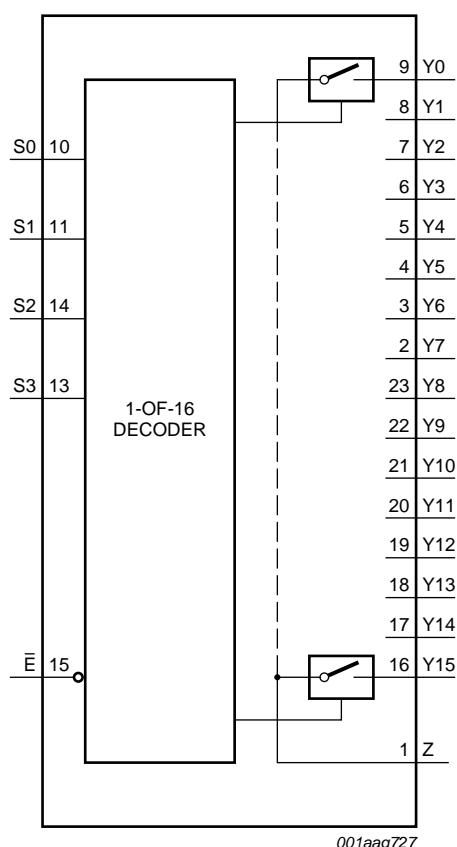


Fig 4. Functional diagram

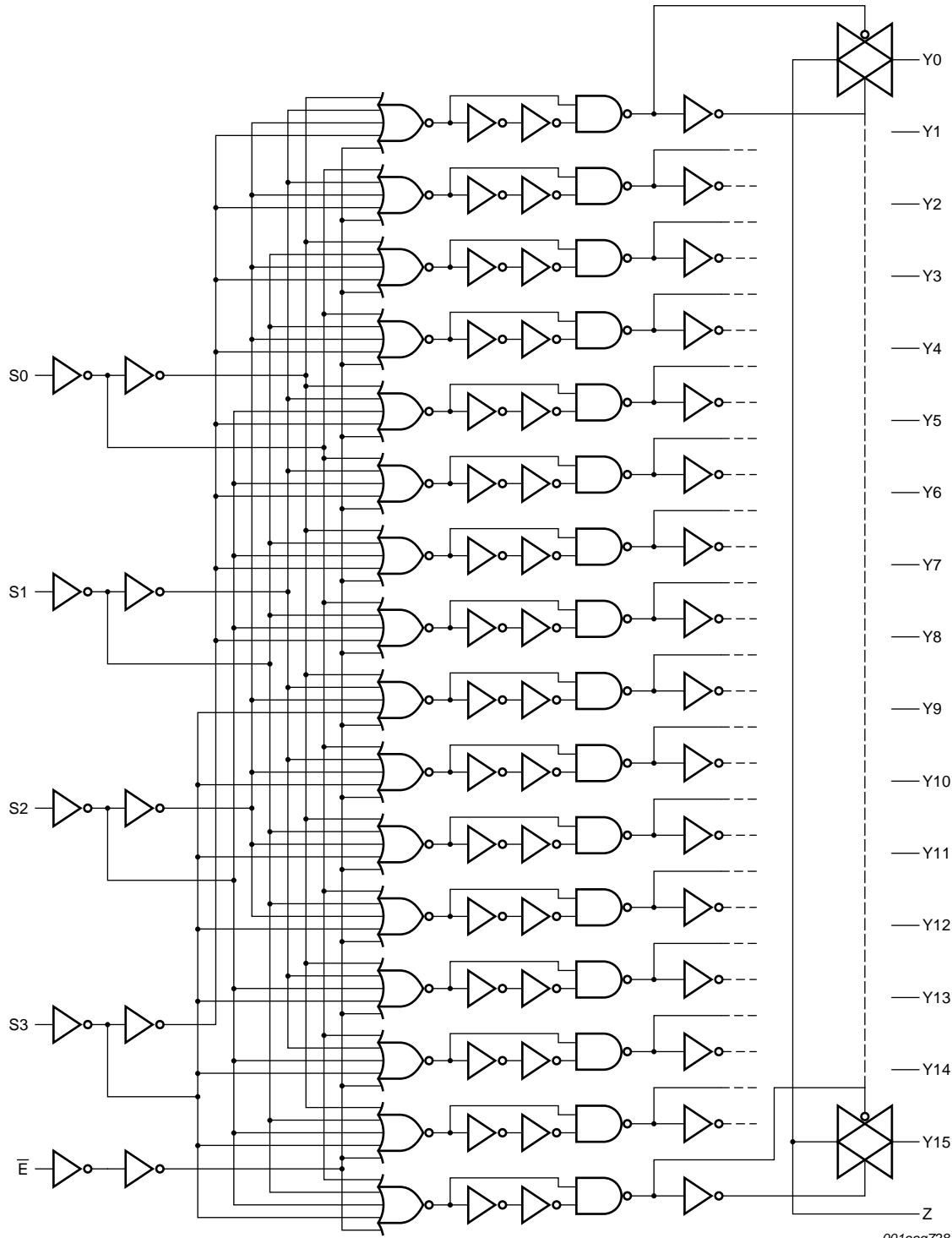


Fig 5. Logic diagram

## 6. Pinning information

### 6.1 Pinning

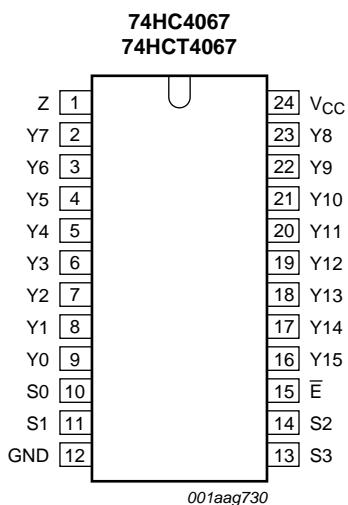
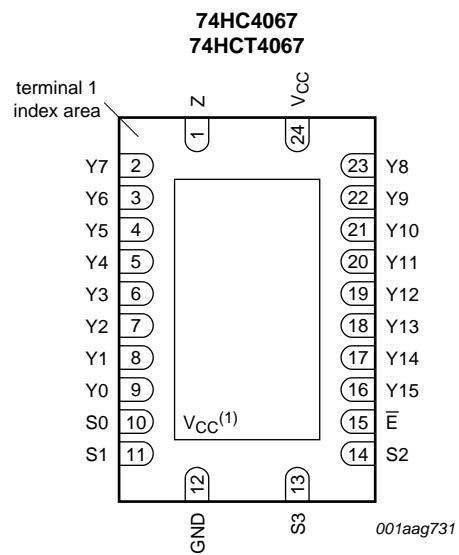


Fig 6. Pin configuration for DIP24, SO24, SSOP24 and TSSOP24



Transparent top view

(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>.

Fig 7. Pin configuration for DHVQFN24

### 6.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
Z	1	common input or output
Y7, Y6, Y5, Y4, Y3, Y2, Y1, Y0, Y15, Y14, Y13, Y12, Y11, Y10, Y9, Y8	2, 3, 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23	independent input or output
S0, S1, S3, S2	10, 11, 13, 14	address input 0
GND	12	ground (0 V)
E	15	enable input (active LOW)
V <sub>CC</sub>	24	supply voltage

## 7. Functional description

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

Inputs					Channel ON
E	S3	S2	S1	S0	
L	L	L	L	L	Y0 to Z
L	L	L	L	H	Y1 to Z
L	L	L	H	L	Y2 to Z
L	L	L	H	H	Y3 to Z
L	L	H	L	L	Y4 to Z
L	L	H	L	H	Y5 to Z
L	L	H	H	L	Y6 to Z
L	L	H	H	H	Y7 to Z
L	H	L	L	L	Y8 to Z
L	H	L	L	H	Y9 to Z
L	H	L	H	L	Y10 to Z
L	H	L	H	H	Y11 to Z
L	H	H	L	L	Y12 to Z
L	H	H	L	H	Y13 to Z
L	H	H	H	L	Y14 to Z
L	H	H	H	H	Y15 to Z
H	X	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 <sub>CC</sub>	supply voltage		[1] -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	-	±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

**Table 4. Limiting values ...continued**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$			
		DIP24 package	[2]	-	750 mW
		SO24 package	[3]	-	500 mW
		SSOP24 package	[4]	-	500 mW
		TSSOP24 package	[4]	-	500 mW
P	power dissipation	per switch	-	100	mW

[1] To avoid drawing  $V_{\text{CC}}$  current out of terminal Z, when switch current flows in terminals  $Y_n$ , the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no  $V_{\text{CC}}$  current will flow out of terminals  $Y_n$ . In this case there is no limit for the voltage drop across the switch, but the voltages at  $Y_n$  and Z may not exceed  $V_{\text{CC}}$  or GND.

[2] For DIP24 package:  $P_{\text{tot}}$  derates linearly with 12 mW/K above  $70^{\circ}\text{C}$ .

[3] For SO24 package:  $P_{\text{tot}}$  derates linearly with 8 mW/K above  $70^{\circ}\text{C}$ .

[4] For SSOP24 and TSSOP24 packages:  $P_{\text{tot}}$  derates linearly with 5.5 mW/K above  $60^{\circ}\text{C}$ .

[5] For DHVQFN24 package:  $P_{\text{tot}}$  derates linearly with 4.5 mW/K above  $60^{\circ}\text{C}$ .

## 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>74HC4067</b>						
$V_{\text{CC}}$	supply voltage		2.0	5.0	10.0	V
$V_{\text{I}}$	input voltage		GND	-	$V_{\text{CC}}$	V
$V_{\text{SW}}$	switch voltage		GND	-	$V_{\text{CC}}$	V
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{\text{CC}} = 2.0\text{ V}$	-	-	625	ns
		$V_{\text{CC}} = 4.5\text{ V}$	-	1.67	139	ns
		$V_{\text{CC}} = 6.0\text{ V}$	-	-	83	ns
		$V_{\text{CC}} = 10.0\text{ V}$	-	-	31	ns
$T_{\text{amb}}$	ambient temperature		-40	+25	+125	$^{\circ}\text{C}$
<b>74HCT4067</b>						
$V_{\text{CC}}$	supply voltage		4.5	5.0	5.5	V
$V_{\text{I}}$	input voltage		GND	-	$V_{\text{CC}}$	V
$V_{\text{SW}}$	switch voltage		GND	-	$V_{\text{CC}}$	V
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{\text{CC}} = 4.5\text{ V}$	-	1.67	139	ns
			-	-	83	ns
$T_{\text{amb}}$	ambient temperature		-40	+25	+125	$^{\circ}\text{C}$

## 10. Static characteristics

**Table 6.  $R_{ON}$  resistance per switch for types 74HC4067 and 74HCT4067**

$V_I = V_{IH}$  or  $V_{IL}$ ; for test circuit see [Figure 8](#).

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

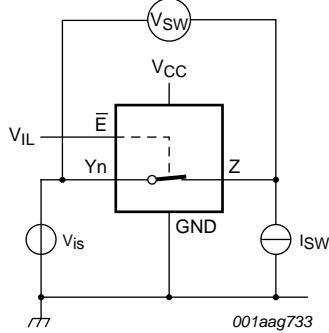
$V_{OS}$  is the output voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an output.

For 74HC4067:  $V_{CC} - GND = 2.0$  V, 4.5 V, 6.0 V and 9.0 V.

For 74HCT4067:  $V_{CC} - GND = 4.5$  V.

Symbol	Parameter	Conditions	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$R_{ON(peak)}$	ON resistance (peak)	$V_{IS} = V_{CC}$ to GND					
		$V_{CC} = 2.0$ V; $I_{SW} = 100$ $\mu$ A	[1]	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V; $I_{SW} = 1000$ $\mu$ A	110	180	225	270	$\Omega$
		$V_{CC} = 6.0$ V; $I_{SW} = 1000$ $\mu$ A	95	160	200	240	$\Omega$
$R_{ON(rail)}$	ON resistance (rail)	$V_{IS} = GND$ or $V_{CC}$					
		$V_{CC} = 2.0$ V; $I_{SW} = 100$ $\mu$ A	[1]	150	-	-	$\Omega$
		$V_{CC} = 4.5$ V; $I_{SW} = 1000$ $\mu$ A	90	160	200	240	$\Omega$
		$V_{CC} = 6.0$ V; $I_{SW} = 1000$ $\mu$ A	80	140	175	210	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_{IS} = V_{CC}$ to GND					
		$V_{CC} = 2.0$ V	[1]	-	-	-	$\Omega$
		$V_{CC} = 4.5$ V	9	-	-	-	$\Omega$
		$V_{CC} = 6.0$ V	8	-	-	-	$\Omega$
		$V_{CC} = 9.0$ V	6	-	-	-	$\Omega$

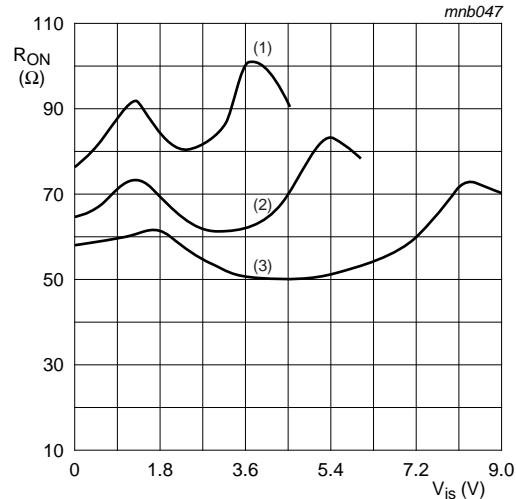
[1] At supply voltages ( $V_{CC} - GND$ ) approaching 2 V, the analog switch ON resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.



$V_{IS} = 0 \text{ V to } (V_{CC} - \text{GND})$

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

Fig 8. Test circuit for measuring  $R_{ON}$



$V_{IS} = 0 \text{ V to } (V_{CC} - \text{GND})$

(1)  $V_{CC} = 4.5 \text{ V}$

(2)  $V_{CC} = 6.0 \text{ V}$

(3)  $V_{CC} = 9.0 \text{ V}$

Fig 9. Typical  $R_{ON}$  as a function of input voltage  $V_{IS}$

Table 7. Static characteristics 74HC4067

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	Max	Unit
<b><math>T_{amb} = 25 \text{ }^{\circ}\text{C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0 \text{ V}$	1.5	1.2	-	V
		$V_{CC} = 4.5 \text{ V}$	3.15	2.4	-	V
		$V_{CC} = 6.0 \text{ V}$	4.2	3.2	-	V
		$V_{CC} = 9.0 \text{ V}$	6.3	4.7	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0 \text{ V}$	-	0.8	0.5	V
		$V_{CC} = 4.5 \text{ V}$	-	2.1	1.35	V
		$V_{CC} = 6.0 \text{ V}$	-	2.8	1.80	V
		$V_{CC} = 9.0 \text{ V}$	-	4.3	2.70	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND				
		$V_{CC} = 6.0 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
		$V_{CC} = 10.0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}; V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 10</a>				
		per channel	-	-	$\pm 0.1$	$\mu\text{A}$
		all channels	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}; V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 11</a>	-	-	$\pm 0.8$	$\mu\text{A}$

**Table 7. Static characteristics 74HC4067 ...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	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	-	-	8.0	$\mu A$
		$V_{CC} = 10.0$ V	-	-	16.0	$\mu A$
$C_I$	input capacitance		-	3.5	-	pF
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °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 10</a>				
		per channel	-	-	$\pm 1.0$	$\mu A$
		all channels	-	-	$\pm 8.0$	$\mu A$
$I_{S(ON)}$	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 11</a>	-	-	$\pm 8.0$	$\mu A$
$I_{CC}$	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	-	-	80.0	$\mu A$
		$V_{CC} = 10.0$ V	-	-	160	$\mu A$
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °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	-	-	$\pm 2.0$	$\mu A$

**Table 7. Static characteristics 74HC4067 ...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	Max	Unit
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{sw}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 10</a>	-	-	$\pm 1.0$	$\mu\text{A}$
		per channel				
		all channels				
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{sw}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 11</a>	-	-	$\pm 8.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND	-	-	160	$\mu\text{A}$
		$V_{CC} = 6.0 \text{ V}$				
		$V_{CC} = 10.0 \text{ V}$	-	-	320	$\mu\text{A}$

**Table 8. Static characteristics 74HCT4067**

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	Max	Unit
<b><math>T_{amb} = 25^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	2.0	1.6	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	1.2	0.8	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{S(OFF)}$	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 10</a>	-	-	$\pm 0.1$	$\mu\text{A}$
		per channel				
		all channels				
$I_{S(ON)}$	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 11</a>	-	-	$\pm 0.8$	$\mu\text{A}$
$I_{CC}$	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 $5.5 \text{ V}$	-	-	8.0	$\mu\text{A}$
$\Delta I_{CC}$	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 $5.5 \text{ V}$	-	60	216	$\mu\text{A}$
		pin E				
		pin Sn				
$C_I$	input capacitance		-	3.5	-	pF
<b><math>T_{amb} = -40^\circ\text{C}</math> to <math>+85^\circ\text{C}</math></b>						
$V_{IH}$	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 10</a>	-	-	$\pm 1.0$	$\mu\text{A}$
		per channel				
		all channels				

**Table 8. Static characteristics 74HCT4067 ...continued**

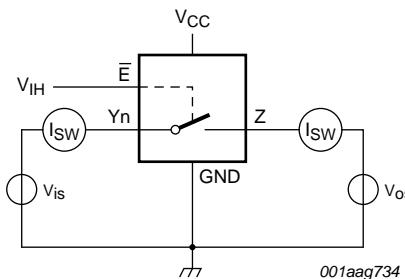
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

 $V_{is}$  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.

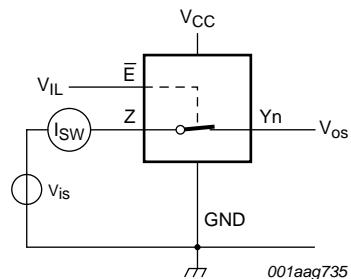
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 5.5 \text{ V}$ ; $V_I = V_{IH}$ or $V_{IL}$ ; $ V_{SW}  = V_{CC} - \text{GND}$ ; see <a href="#">Figure 11</a>	-	-	$\pm 8.0$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $V_{is} = \text{GND}$ or $V_{CC}$ ; $V_{os} = V_{CC}$ or GND; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$	-	-	80.0	$\mu\text{A}$
$\Delta I_{CC}$	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 $5.5 \text{ V}$	-	-	270	$\mu\text{A}$
					225	$\mu\text{A}$
					225	$\mu\text{A}$

 $T_{\text{amb}} = -40 \text{ }^{\circ}\text{C}$  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 10</a>	-	-	$\pm 8.0$	$\mu\text{A}$
					$\pm 1.0$	$\mu\text{A}$
					$\pm 8.0$	$\mu\text{A}$
$I_{S(ON)}$	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 11</a>	-	-	$\pm 8.0$	$\mu\text{A}$
$I_{CC}$	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 $5.5 \text{ V}$	-	-	160	$\mu\text{A}$
$\Delta I_{CC}$	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 $5.5 \text{ V}$	-	-	294	$\mu\text{A}$
					245	$\mu\text{A}$
					245	$\mu\text{A}$



$V_{is} = V_{CC}$  and  $V_{os} = \text{GND}$   
 $V_{is} = \text{GND}$  and  $V_{os} = V_{CC}$

**Fig 10. 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 11. Test circuit for measuring ON-state leakage current**

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics 74HC4067**

$GND = 0 \text{ V}$ ;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$  unless specified otherwise; for test circuit see [Figure 14](#).

$V_{IS}$  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	25 °C		−40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$t_{pd}$	propagation delay	Yn to Z; see <a href="#">Figure 12</a>	[1][2]				
		$V_{CC} = 2.0 \text{ V}$	25	75	95	110	ns
		$V_{CC} = 4.5 \text{ V}$	9	15	19	22	ns
		$V_{CC} = 6.0 \text{ V}$	7	13	16	19	ns
		$V_{CC} = 9.0 \text{ V}$	5	9	11	14	ns
		Z to Yn					
		$V_{CC} = 2.0 \text{ V}$	18	60	75	90	ns
		$V_{CC} = 4.5 \text{ V}$	6	12	15	18	ns
		$V_{CC} = 6.0 \text{ V}$	5	10	13	15	ns
		$V_{CC} = 9.0 \text{ V}$	4	8	10	12	ns
$t_{off}$	turn-off time	$\bar{E}$ to $Y_n$ ; see <a href="#">Figure 13</a>	[3]				
		$V_{CC} = 2.0 \text{ V}$	74	250	315	375	ns
		$V_{CC} = 4.5 \text{ V}$	27	50	63	75	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	27	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}$	22	43	54	64	ns
		$V_{CC} = 9.0 \text{ V}$	20	38	48	57	ns
		Sn to $Y_n$					
		$V_{CC} = 2.0 \text{ V}$	83	250	315	375	ns
		$V_{CC} = 4.5 \text{ V}$	30	50	63	75	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	29	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}$	24	43	54	64	ns
		$V_{CC} = 9.0 \text{ V}$	21	38	48	57	ns
		$\bar{E}$ to Z					
		$V_{CC} = 2.0 \text{ V}$	85	275	345	415	ns
		$V_{CC} = 4.5 \text{ V}$	31	55	69	83	ns
		$V_{CC} = 6.0 \text{ V}$	25	47	59	71	ns
		$V_{CC} = 9.0 \text{ V}$	24	42	53	63	ns
		Sn to Z					
		$V_{CC} = 2.0 \text{ V}$	94	290	365	435	ns
		$V_{CC} = 4.5 \text{ V}$	34	58	73	87	ns
		$V_{CC} = 6.0 \text{ V}$	27	47	62	74	ns
		$V_{CC} = 9.0 \text{ V}$	25	45	56	68	ns

**Table 9. Dynamic characteristics 74HC4067 ...continued**

$GND = 0 \text{ V}$ ;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$  unless specified otherwise; for test circuit see [Figure 14](#).

$V_{IS}$  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	25 °C		-40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
t <sub>on</sub>	turn-on time	Ē to Yn; see <a href="#">Figure 13</a>	[4]				
		V <sub>CC</sub> = 2.0 V	80	275	345	415	ns
		V <sub>CC</sub> = 4.5 V	29	55	69	83	ns
		V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF	26	-	-	-	ns
		V <sub>CC</sub> = 6.0 V	23	47	59	71	ns
		V <sub>CC</sub> = 9.0 V	17	42	53	63	ns
		Sn to Yn					
		V <sub>CC</sub> = 2.0 V	88	300	375	450	ns
		V <sub>CC</sub> = 4.5 V	32	60	75	90	ns
		V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF	29	-	-	-	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>CC</sub> = 6.0 V	26	51	64	77	ns
		V <sub>CC</sub> = 9.0 V	18	45	56	68	ns
		Ē to Z					
		V <sub>CC</sub> = 2.0 V	85	275	345	415	ns
		V <sub>CC</sub> = 4.5 V	31	55	69	83	ns
		V <sub>CC</sub> = 6.0 V	25	47	59	71	ns
		V <sub>CC</sub> = 9.0 V	18	42	53	63	ns
		Sn to Z					
		V <sub>CC</sub> = 2.0 V	94	300	375	450	ns
		V <sub>CC</sub> = 4.5 V	34	60	75	90	ns

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

[2] Due to higher Z terminal capacitance (16 switches versus 1) the delay figures to the Z terminal are higher than those to the Y terminal.

[3]  $t_{op}$  is the same as  $t_{PHZ}$  and  $t_{PIZ}$ .

[4]  $t_{\text{off}}$  is the same as  $t_{\text{PZH}}$  and  $t_{\text{PZI}}$ .

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

$$P_{DP} = C_{DP} \times V_{CC}^2 \times f_i + \sum \{ (C_L + C_{sw}) \times V_{CC}^2 \times f_s \} \text{ where:}$$

$f_i$  = input frequency in MHz

$f$  = output frequency in MHz

$\Sigma\{(C_1 + C_2) \times V_{cc}^2 \times f\}$  = sum of outputs:

$C_o$  = output load capacitance in pF

$C_L$  = output load capacitance in pF;  
 $C_s$  = switch capacitance in pF;

$C_{sw}$  = switch capacitance in  $\mu$ F;

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

**Table 10. Dynamic characteristics 74HCT4067**

$GND = 0 \text{ V}$ ;  $t_r = t_f = 6 \text{ ns}$ ;  $C_L = 50 \text{ pF}$  unless specified otherwise; for test circuit see [Figure 14](#).

$V_{IS}$  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	25 °C		−40 °C to +125 °C		Unit
			Typ	Max	Max (85 °C)	Max (125 °C)	
$t_{pd}$	propagation delay	Yn to Z; see <a href="#">Figure 12</a>	[1][2]				
		$V_{CC} = 4.5 \text{ V}$	9	15	19	22	ns
$t_{off}$	turn-off time	Z to Yn	6	12	15	18	ns
		$V_{CC} = 4.5 \text{ V}$	26	55	69	83	ns
$t_{on}$	turn-on time	$\bar{E}$ to Yn; see <a href="#">Figure 13</a>	[3]				
		$V_{CC} = 4.5 \text{ V}$	26	-	-	-	ns
$C_{PD}$	power dissipation capacitance	Sn to Yn	31	55	69	83	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	30	-	-	-	ns
$t_{on}$	turn-on time	$\bar{E}$ to Z	31	60	75	90	ns
		$V_{CC} = 4.5 \text{ V}$	30	60	75	90	ns
$t_{on}$	turn-on time	Sn to Z	35	60	75	90	ns
		$V_{CC} = 4.5 \text{ V}$	35	60	75	90	ns
$t_{on}$	turn-on time	$\bar{E}$ to Yn; see <a href="#">Figure 13</a>	[4]				
		$V_{CC} = 4.5 \text{ V}$	32	60	75	90	ns
$t_{on}$	turn-on time	$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	32	-	-	-	ns
		Sn to Yn	35	60	75	90	ns
$t_{on}$	turn-on time	$V_{CC} = 4.5 \text{ V}$	35	60	75	90	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	33	-	-	-	ns
$t_{on}$	turn-on time	$\bar{E}$ to Z	38	65	81	98	ns
		$V_{CC} = 4.5 \text{ V}$	38	65	81	98	ns
$t_{on}$	turn-on time	Sn to Z	38	65	81	98	ns
		$V_{CC} = 4.5 \text{ V}$	38	65	81	98	ns

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

[2] Due to higher Z terminal capacitance (16 switches versus 1) the delay figures to the Z terminal are higher than those to the Y terminal.

[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.

## 12. Waveforms

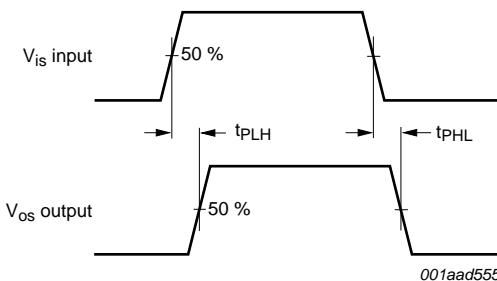
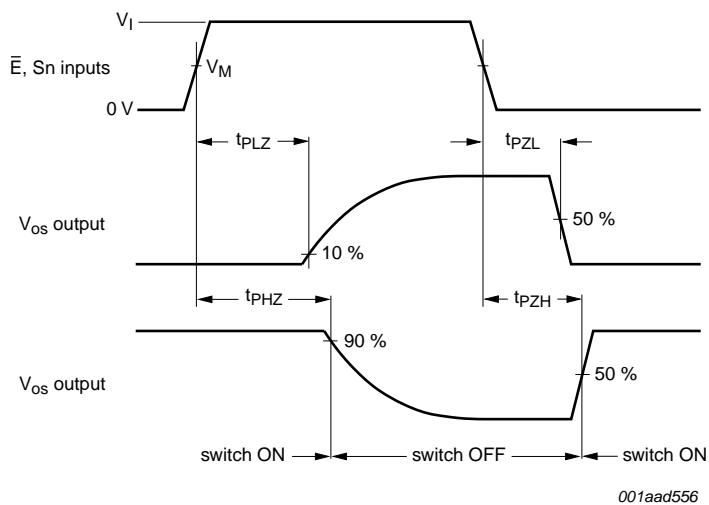


Fig 12. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays

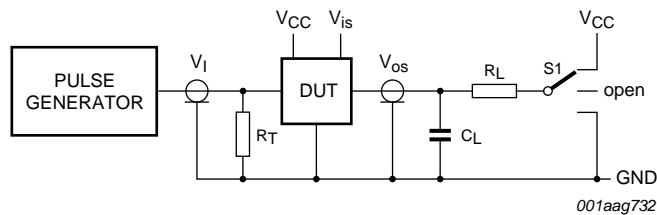
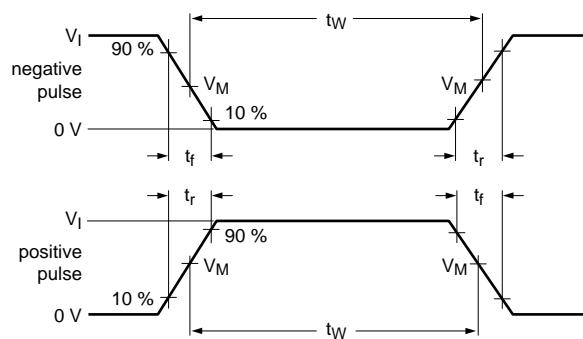


Measurement points are shown in [Table 11](#).

Fig 13. Turn-on and turn-off times

Table 11. Measurement points

Type	$V_I$	$V_M$
74HC4067	$V_{CC}$	$0.5V_{CC}$
74HCT4067	3.0 V	1.3 V



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 resistor.

S1 = Test selection switch.

**Fig 14. Load circuitry for measuring switching times**

**Table 12. Test data**

Test	Input				Output		S1 position	
	Control E	Address Sn	Switch Yn (Z)	$t_r, t_f$	Switch Z (Yn)			
					$C_L$	$R_L$		
$t_{PHL}, t_{PLH}$	GND	GND or $V_{CC}$	GND to $V_{CC}$	6 ns	50 pF	-	open	
$t_{PHZ}, t_{PZH}$	GND to $V_{CC}$	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 to $V_{CC}$	GND	6 ns	50 pF, 15 pF	1 k $\Omega$	$V_{CC}$	

[1] For 74HCT4067: maximum input voltage  $V_I = 3.0$  V.

## 13. Additional dynamic characteristics

**Table 13. Additional dynamic characteristics**

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

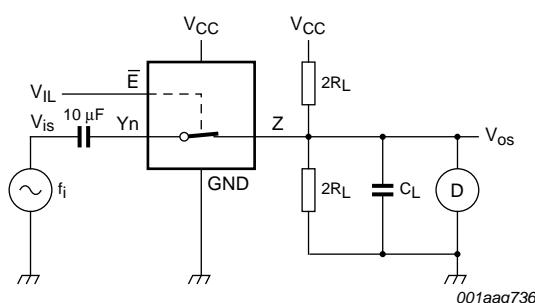
$V_{is}$  is the input voltage at a  $Y_n$  or  $Z$  terminal, whichever is assigned as an input.

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

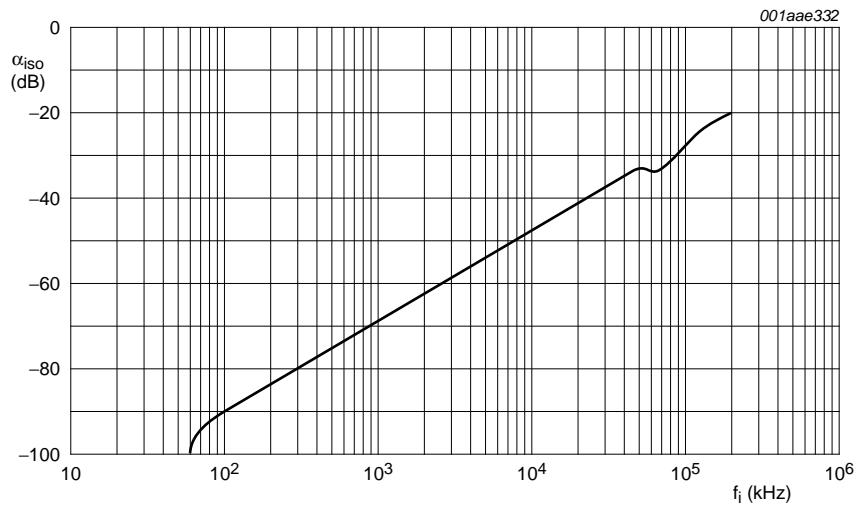
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	$R_L = 10 \text{ k}\Omega$ ; $C_L = 50 \text{ pF}$ ; see <a href="#">Figure 15</a> $f_i = 1 \text{ kHz}$				
		$V_{CC} = 4.5 \text{ V}$ ; $V_{is(p-p)} = 4.0 \text{ V}$	-	0.04	-	%
		$V_{CC} = 9.0 \text{ V}$ ; $V_{is(p-p)} = 8.0 \text{ V}$	-	0.02	-	%
		$f_i = 10 \text{ kHz}$				
		$V_{CC} = 4.5 \text{ V}$ ; $V_{is(p-p)} = 4.0 \text{ V}$	-	0.12	-	%
		$V_{CC} = 9.0 \text{ V}$ ; $V_{is(p-p)} = 8.0 \text{ V}$	-	0.06	-	%
$\alpha_{iso}$	isolation (OFF-state)	$R_L = 600 \text{ }\Omega$ ; $C_L = 50 \text{ pF}$ ; see <a href="#">Figure 16</a>	[1]			
		$V_{CC} = 4.5 \text{ V}$	-	-50	-	dB
		$V_{CC} = 9.0 \text{ V}$	-	-50	-	dB
$f_{(-3\text{dB})}$	-3 dB frequency response	$R_L = 50 \text{ }\Omega$ ; $C_L = 10 \text{ pF}$ ; see <a href="#">Figure 17</a>	[2]			
		$V_{CC} = 4.5 \text{ V}$	-	90	-	MHz
		$V_{CC} = 9.0 \text{ V}$	-	100	-	MHz
$C_{sw}$	switch capacitance	independent pins $Y$	-	5	-	pF
		common pin $Z$	-	45	-	pF

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

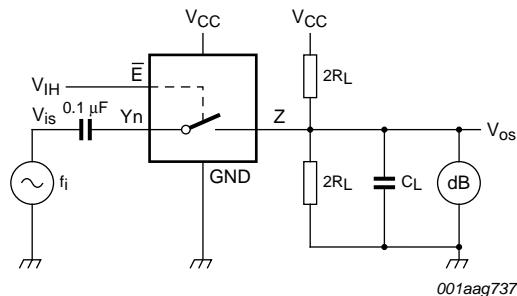
[2] Adjust input voltage  $V_{is}$  to 0 dBm level at  $V_{os}$  for  $f_i = 1 \text{ MHz}$  (0 dBm = 1 mW into  $50 \text{ }\Omega$ ). After set-up,  $f_i$  is increased to obtain a reading of -3 dB at  $V_{os}$ .



**Fig 15. Test circuit for measuring total harmonic distortion**



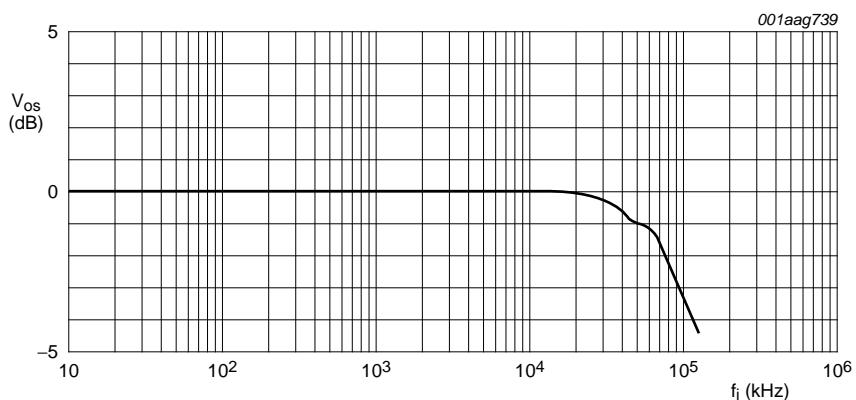
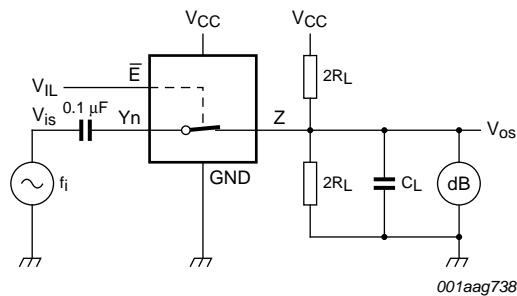
a. Isolation (OFF-state)



b. Test circuit

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

Fig 16. Isolation (OFF-state) as a function of frequency

a. Typical  $-3$  dB frequency response

b. Test circuit

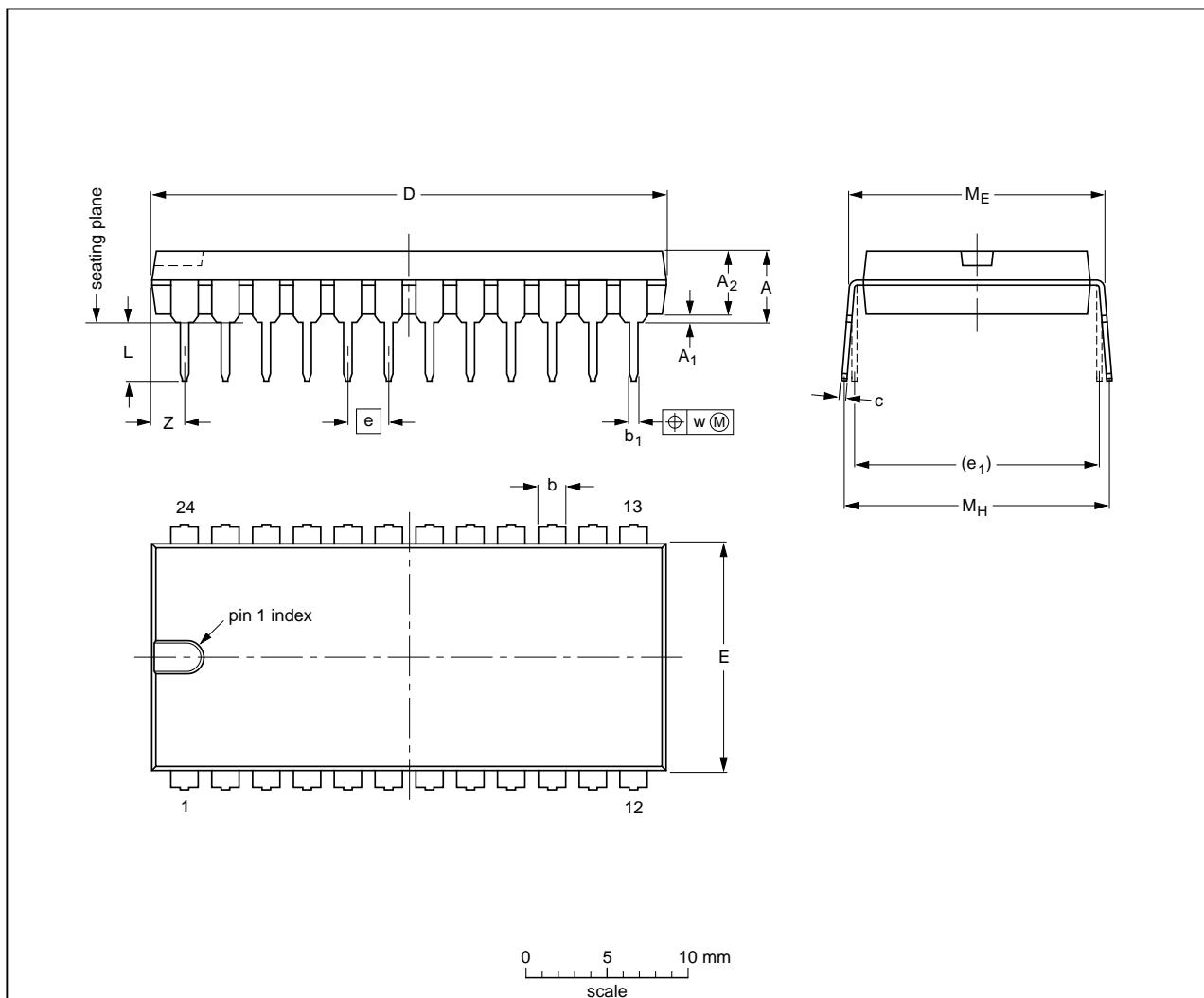
$V_{CC} = 4.5$  V; GND = 0 V;  $R_L = 50 \Omega$ ;  $R_{source} = 1 \text{ k}\Omega$ .

Fig 17.  $-3$  dB frequency response

## 14. Package outline

DIP24: plastic dual in-line package; 24 leads (600 mil)

SOT101-1



### 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	5.1	0.51	4	1.7 1.3	0.53 0.38	0.32 0.23	32.0 31.4	14.1 13.7	2.54	15.24	3.9 3.4	15.80 15.24	17.15 15.90	0.25	2.2
inches	0.2	0.02	0.16	0.066 0.051	0.021 0.015	0.013 0.009	1.26 1.24	0.56 0.54	0.1	0.6	0.15 0.13	0.62 0.60	0.68 0.63	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			
SOT101-1	051G02	MO-015	SC-509-24			99-12-27 03-02-13

Fig 18. Package outline SOT101-1 (DIP24)

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1

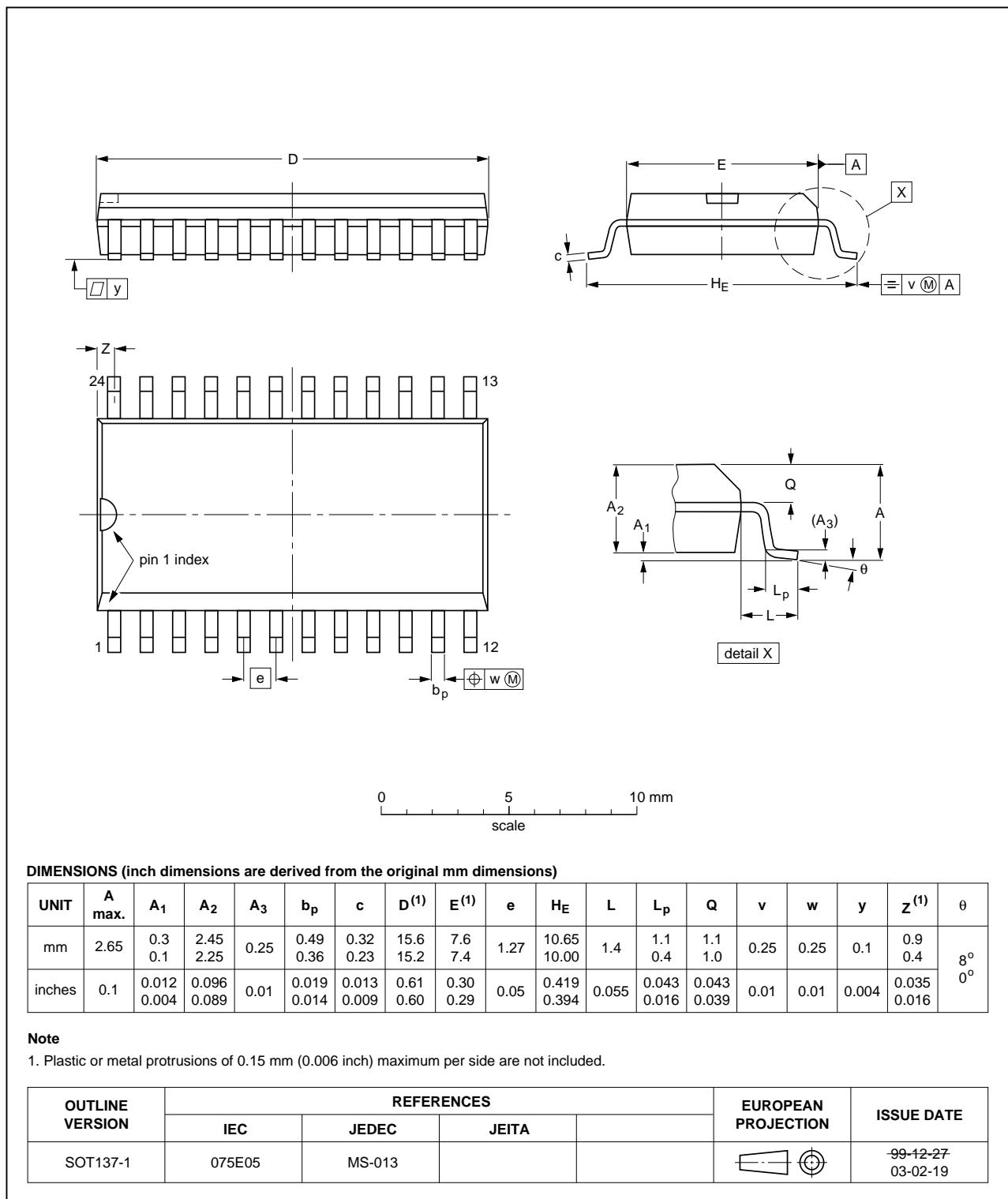


Fig 19. Package outline SOT137-1 (SO24)

SSOP24: plastic shrink small outline package; 24 leads; body width 5.3 mm

SOT340-1

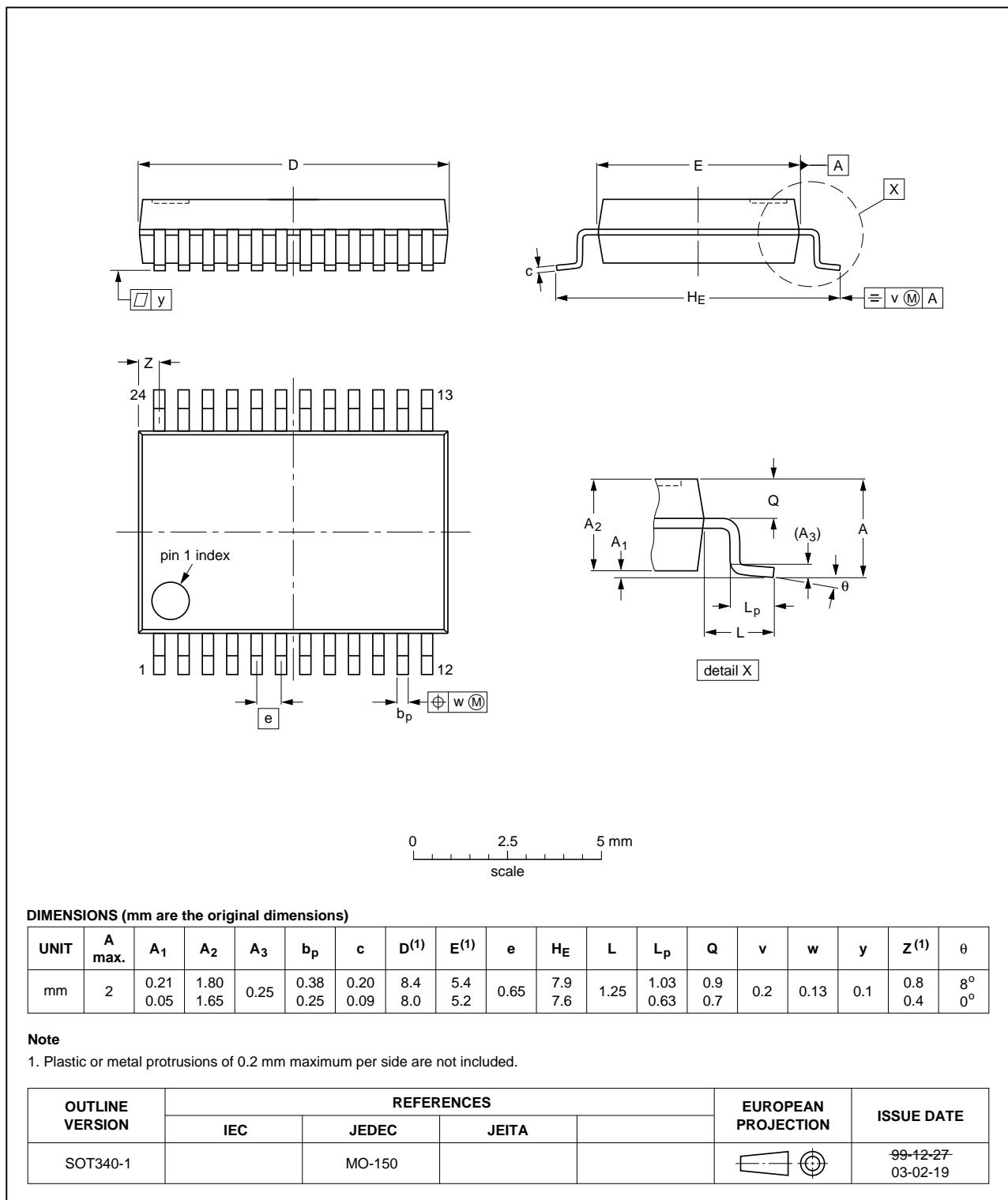


Fig 20. Package outline SOT340-1 (SSOP24)

TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1

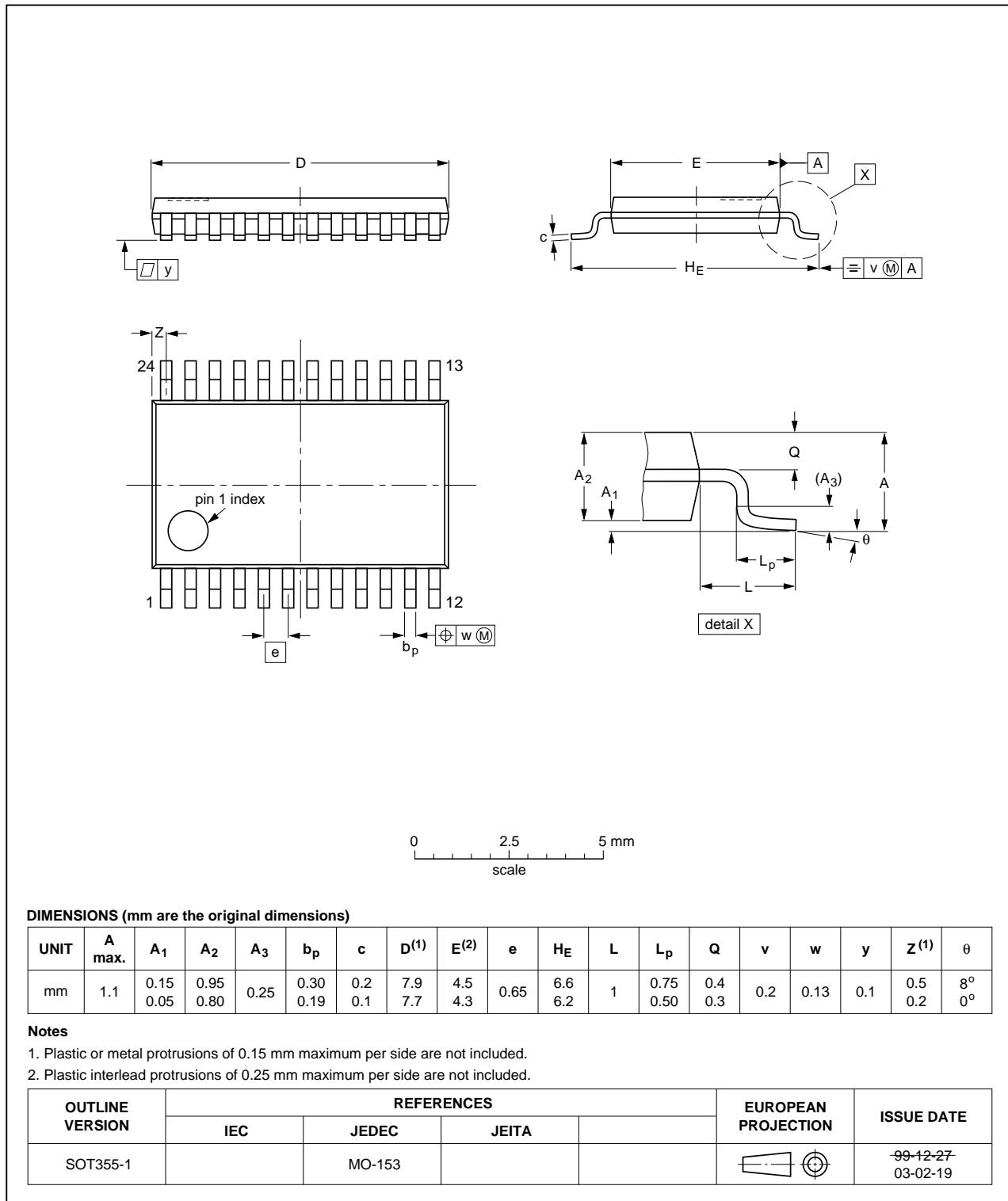


Fig 21. Package outline SOT355-1 (TSSOP24)

DHVQFN24: plastic dual in-line compatible thermal enhanced very thin quad flat package;  
no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm

SOT815-1

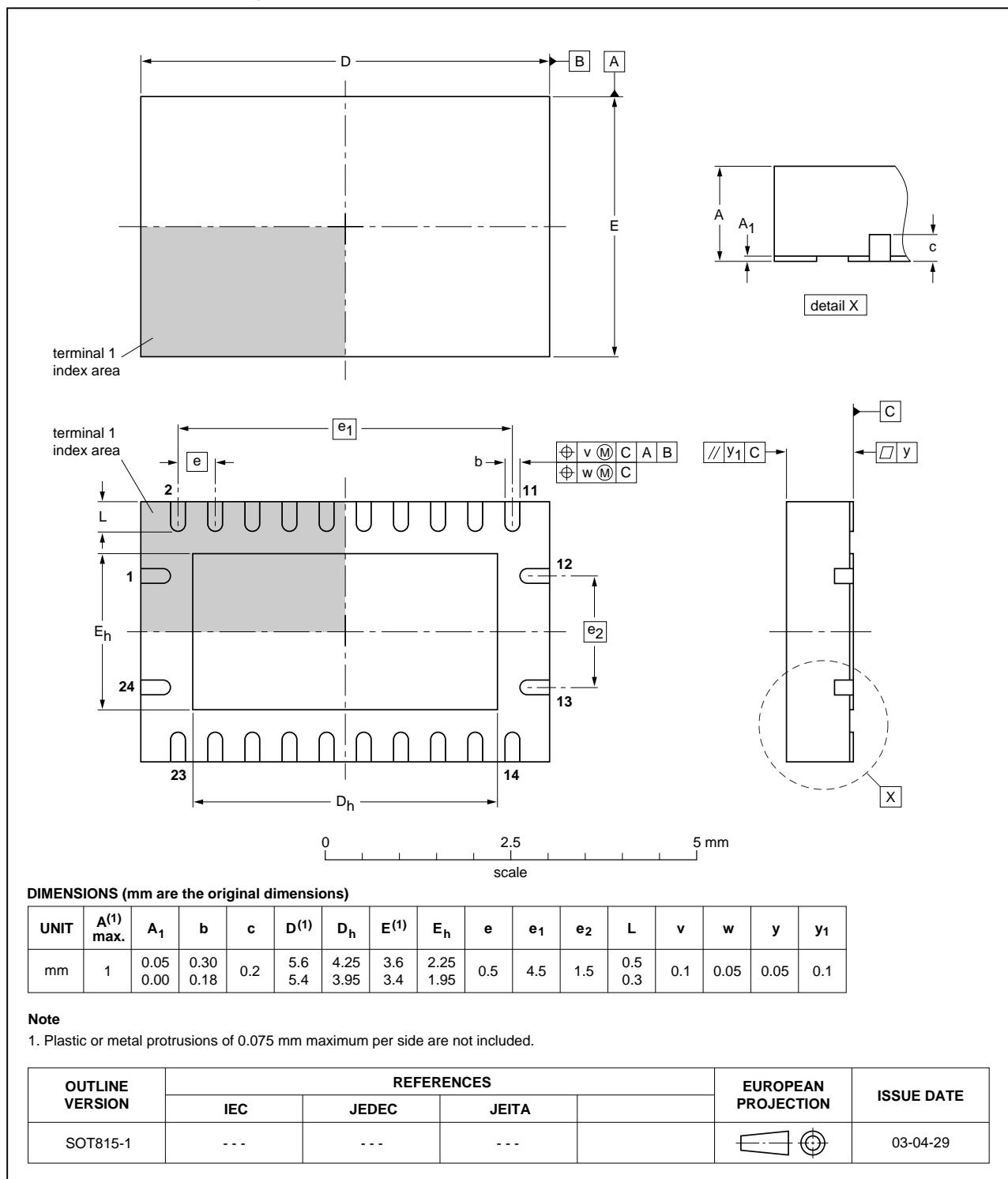


Fig 22. Package outline SOT815-1 (DHVQFN24)

## 15. Revision history

**Table 14. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4067 v.5	20111213	Product data sheet	-	74HC_HCT4067 v.4
Modifications:		• Legal pages updated.		
74HC_HCT4067 v.4	20110518	Product data sheet	-	74HC_HCT4067 v.3
74HC_HCT4067 v.3	20071015	Product data sheet	-	74HC_HCT4067_CNV v.2
74HC_HCT4067_CNV v.2	19970901	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".

[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 URL <http://www.nxp.com>.

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Date of release: 13 December 2011

Document identifier: 74HC\_HCT4067