

# 74AHC2G241; 74AHCT2G241

Dual buffer/line driver; 3-state

Rev. 01 — 10 March 2004

Product data sheet

## 1. General description

The 74AHC2G241; 74AHCT2G241 is a high-speed Si-gate CMOS device.

The 74AHC2G241; 74AHCT2G241 is a dual non-inverting buffer/line driver with 3-state outputs. The 3-state outputs are controlled by the output enable inputs  $1\overline{OE}$  and 2OE. A HIGH level at pin  $1\overline{OE}$  causes output 1Y to assume a high-impedance OFF-state. A LOW level at pin 2OE causes output 2Y to assume a high-impedance OFF-state. Schmitt-trigger action at all inputs makes the circuit highly tolerant for slower input rise and fall times.

## 2. Features

- Symmetrical output impedance
- High noise immunity
- ESD protection:
  - ◆ HBM EIA/JESD22-A114-A exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
  - ◆ CDM EIA/JESD22-C101 exceeds 1000 V.
- Low power dissipation
- Balanced propagation delays
- SOT505-2 and SOT765-1 package
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ .

## 3. Quick reference data

**Table 1: Quick reference data**

$GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f \leq 3.0\text{ ns}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Type 74AHC2G241</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.4	5.5	ns
$t_{PZH}$ , $t_{PZL}$	enable time $1\overline{OE}$ to 1Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.6	5.1	ns
	enable time 2OE to 2Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.6	5.6	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time $1\overline{OE}$ to 1Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	4.1	6.8	ns
	disable time 2OE to 2Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	4.3	6.8	ns
$C_I$	input capacitance		-	1.5	10	pF
$C_{PD}$	power dissipation capacitance	$C_L = 50\text{ pF}$ ; $f = 1\text{ MHz}$ <sup>[1][2]</sup>	-	10	-	pF

**PHILIPS**

Table 1: Quick reference data ...continued

GND = 0 V;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f \leq 3.0\text{ ns}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Type 74AHCT2G241</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.4	5.5	ns
$t_{PZH}$ , $t_{PZL}$	enable time 1OE to 1Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.9	5.1	ns
	enable time 2OE to 2Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	3.4	5.6	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time 1OE to 1Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	4.5	6.8	ns
	disable time 2OE to 2Y	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	4.0	6.8	ns
$C_I$	input capacitance		-	1.5	10	pF
$C_{PD}$	power dissipation capacitance	$C_L = 50\text{ pF}$ ; $f = 1\text{ MHz}$	[1][2]	10	-	pF

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  where: $f_i$  = input frequency in MHz; $f_o$  = output frequency in MHz; $C_L$  = output load capacitance in pF; $V_{CC}$  = supply voltage in Volts;

N = total load switching outputs;

 $\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.[2] The condition is  $V_I = \text{GND to } V_{CC}$ .

## 4. Ordering information

Table 2: Ordering information

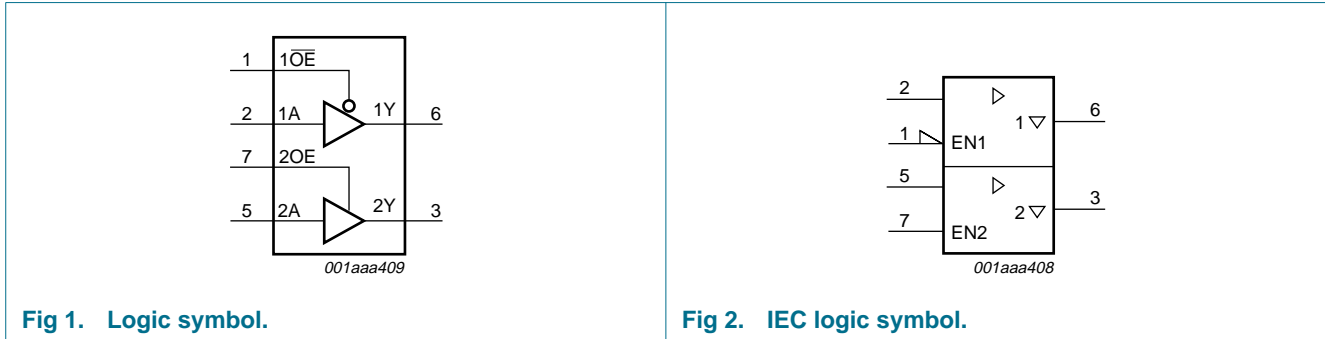
Type number	Package			
	Temperature range	Name	Description	Version
74AHC2G241DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74AHCT2G241DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74AHC2G241DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AHCT2G241DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1

## 5. Marking

Table 3: Marking

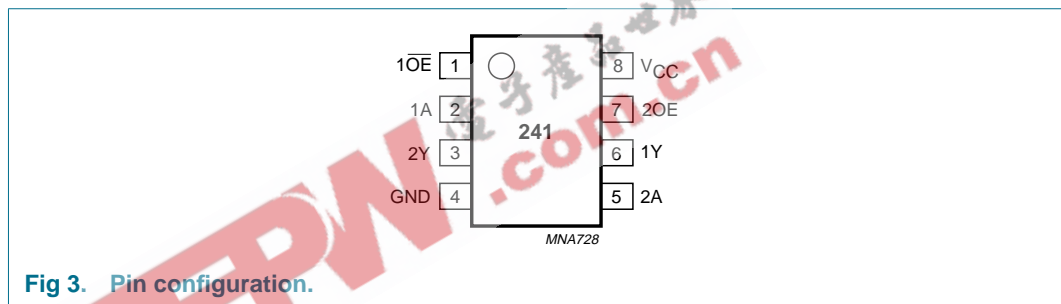
Type number	Marking code
74AHC2G241DP	A241
74AHCT2G241DP	C241
74AHC2G241DC	A41
74AHCT2G241DC	C41

## 6. Functional diagram



## 7. Pinning information

### 7.1 Pinning



### 7.2 Pin description

Table 4: Pin description

Symbol	Pin	Description
1OE	1	output enable input (active LOW)
1A	2	data input
2Y	3	data output
GND	4	ground (0 V)
2A	5	data input
1Y	6	data output
2OE	7	output enable input (active HIGH)
V <sub>CC</sub>	8	supply voltage

## 8. Functional description

Table 5: Function table [1]

Input		Output	Input		Output
1OE	1A	1Y	2OE	2A	2Y
L	L	L	H	L	L
L	H	H	H	H	H
H	X	Z	L	X	Z

- [1] H = HIGH voltage level;  
L = LOW voltage level;  
X = don't care;  
Z = high-impedance OFF-state.

## 9. Limiting values

Table 6: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+7.0	V
$V_I$	input voltage		-0.5	+7.0	V
$I_{IK}$	input diode current	$V_I < -0.5$ V	-	-20	mA
$I_{OK}$	output diode current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	±20	mA
$I_O$	output source or sink current	$V_O = -0.5$ V to $(V_{CC} + 0.5)$ V	-	±25	mA
$I_{CC}, I_{GND}$	$V_{CC}$ or GND current		-	±75	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	power dissipation	$T_{amb} = -40$ °C to +125 °C	-	250	mW

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## 10. Recommended operating conditions

Table 7: Recommended operating conditions

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Type 74AHC2G241</b>						
$V_{CC}$	supply voltage		2.0	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$T_{amb}$	operating ambient temperature	see <a href="#">Section 11</a> and <a href="#">Section 12</a>	-40	+25	+125	°C
$t_r, t_f$	input rise and fall times	$V_{CC} = 3.3$ V ± 0.3 V	-	-	100	ns/V
		$V_{CC} = 5$ V ± 0.5 V	-	-	20	ns/V
<b>Type 74AHCT2G241</b>						
$V_{CC}$	supply voltage		4.5	5.0	5.5	V

Table 7: Recommended operating conditions ...continued

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_I$	input voltage		0	-	5.5	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$T_{amb}$	operating ambient temperature	see Section 11 and Section 12	-40	+25	+125	°C
$t_r, t_f$	input rise and fall times	$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	-	-	20	ns/V

## 11. Static characteristics

Table 8: Static characteristics type 74AHC2G241

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25\text{ °C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	-	-	V
		$V_{CC} = 3.0\text{ V}$	2.1	-	-	V
		$V_{CC} = 5.5\text{ V}$	3.85	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	-	0.5	V
		$V_{CC} = 3.0\text{ V}$	-	-	0.9	V
		$V_{CC} = 5.5\text{ V}$	-	-	1.65	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -50\text{ }\mu\text{A}; V_{CC} = 2.0\text{ V}$	1.9	2.0	-	V
		$I_O = -50\text{ }\mu\text{A}; V_{CC} = 3.0\text{ V}$	2.9	3.0	-	V
		$I_O = -50\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$	4.4	4.5	-	V
		$I_O = -4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	2.58	-	-	V
	$I_O = -8.0\text{ mA}; V_{CC} = 4.5\text{ V}$	3.94	-	-	V	
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 50\text{ }\mu\text{A}; V_{CC} = 2.0\text{ V}$	-	0	0.1	V
		$I_O = 50\text{ }\mu\text{A}; V_{CC} = 3.0\text{ V}$	-	0	0.1	V
		$I_O = 50\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$	-	0	0.1	V
		$I_O = 4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	-	-	0.36	V
	$I_O = 8.0\text{ mA}; V_{CC} = 4.5\text{ V}$	-	-	0.36	V	
$I_{OZ}$	3-state OFF-state current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$	-	-	0.25	$\mu\text{A}$
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$	-	-	0.1	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{ A}; V_{CC} = 5.5\text{ V}$	-	-	1.0	$\mu\text{A}$
$C_I$	input capacitance		-	1.5	10	pF
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	-	-	V
		$V_{CC} = 3.0\text{ V}$	2.1	-	-	V
		$V_{CC} = 5.5\text{ V}$	3.85	-	-	V

**Table 8: Static characteristics type 74AHC2G241 ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	-	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V	2.9	-	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.48	-	-	V
		I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.8	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V	-	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.44	V
		I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.44	V
I <sub>OZ</sub>	3-state OFF-state current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	2.5	μA
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	1.0	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	10	μA
C <sub>I</sub>	input capacitance		-	-	10	pF
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	V
		V <sub>CC</sub> = 5.5 V	3.85	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	-	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V	2.9	-	-	V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
		I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.70	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V	-	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V	-	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.55	V
		I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.55	V

**Table 8:** Static characteristics type 74AHC2G241 ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{OZ}$	3-state OFF-state current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	10	$\mu$ A
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	2.0	$\mu$ A
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	40	$\mu$ A
$C_I$	input capacitance		-	-	10	pF

**Table 9:** Static characteristics type 74AHCT2G241

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -50$ $\mu$ A; $V_{CC} = 4.5$ V	4.4	4.5	-	V
		$I_O = -8.0$ mA; $V_{CC} = 4.5$ V	3.94	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 50$ $\mu$ A; $V_{CC} = 4.5$ V	-	0	0.1	V
		$I_O = 8.0$ mA; $V_{CC} = 4.5$ V	-	-	0.36	V
$I_{OZ}$	3-state OFF-state current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	0.25	$\mu$ A
$I_{LI}$	input leakage current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V	-	-	0.1	$\mu$ A
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	1.0	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = 3.4$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	1.35	mA
$C_I$	input capacitance		-	1.5	10	pF
<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	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -50$ $\mu$ A; $V_{CC} = 4.5$ V	4.4	-	-	V
		$I_O = -8.0$ mA; $V_{CC} = 4.5$ V	3.8	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 50$ $\mu$ A; $V_{CC} = 4.5$ V	-	-	0.1	V
		$I_O = 8.0$ mA; $V_{CC} = 4.5$ V	-	-	0.44	V
$I_{OZ}$	3-state OFF-state current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	2.5	$\mu$ A

**Table 9:** Static characteristics type 74AHCT2G241 ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{LI}$	input leakage current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V	-	-	1.0	$\mu$ A
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	10	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = 3.4$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	1.5	mA
$C_I$	input capacitance		-	-	10	pF
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -50$ $\mu$ A; $V_{CC} = 4.5$ V	4.4	-	-	V
		$I_O = -8.0$ mA; $V_{CC} = 4.5$ V	3.70	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 50$ $\mu$ A; $V_{CC} = 4.5$ V	-	-	0.1	V
		$I_O = 8.0$ mA; $V_{CC} = 4.5$ V	-	-	0.55	V
$I_{OZ}$	3-state OFF-state current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	10	$\mu$ A
$I_{LI}$	input leakage current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V	-	-	2.0	$\mu$ A
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	40	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = 3.4$ V; other inputs at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	1.5	mA
$C_I$	input capacitance		-	-	10	pF

## 12. Dynamic characteristics

**Table 10:** Dynamic characteristics type 74AHC2G241GND = 0 V;  $t_r = t_f \leq 3.0$  ns; see [Figure 7](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	see <a href="#">Figure 4</a>				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	[1] -	4.7	8.0	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	[2] -	3.4	5.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	[1] -	6.6	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	[2] -	4.7	7.5	ns



Table 10: Dynamic characteristics type 74AHC2G241 ...continued

GND = 0 V;  $t_r = t_f \leq 3.0$  ns; see Figure 7.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{PZH}$ , $t_{PZL}$	enable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	[1] -	5.0	8.0	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	[2] -	3.6	5.1	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	[1] -	6.9	11.5	ns
	enable time 2OE to 2Y	see Figure 6				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	[1] -	4.9	8.0	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	[2] -	3.6	5.6	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	[1] -	7.0	11.5	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	[1] -	6.0	9.7	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	[2] -	4.1	6.8	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	[1] -	8.3	13.2	ns
	disable time 2OE to 2Y	see Figure 6				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	[1] -	6.3	9.7	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	[2] -	4.3	6.8	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	[1] -	9.0	13.2	ns
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	see Figure 4				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	9.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	6.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	13.0	ns
	enable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	9.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	6.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	13.0	ns
enable time 2OE to 2Y	see Figure 6					
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	9.5	ns	
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	6.3	ns	
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	13.0	ns	
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	1.0	-	9.0	ns	

 $T_{amb} = -40$  °C to +85 °C

Table 10: Dynamic characteristics type 74AHC2G241 ...continued

GND = 0 V;  $t_r = t_f \leq 3.0$  ns; see Figure 7.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{PHZ}, t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	15.0	ns
	disable time 2OE to 2Y	see Figure 6				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	15.0	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	1.0	-	10.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	7.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	14.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	1.0	-	9.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	6.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	14.5	ns
$t_{PHZ}, t_{PLZ}$	enable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	6.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	14.5	ns
	enable time 2OE to 2Y	see Figure 6				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	10.0	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	7.0	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	14.5	ns
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	1.0	-	9.5	ns	
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	11.5	ns	
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.5	ns	
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	16.5	ns	
$t_{PHZ}, t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see Figure 5				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	12.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	16.5	ns
	disable time 2OE to 2Y	see Figure 6				
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	12.5	ns
		$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.5	ns
		$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	16.5	ns
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF	1.0	-	11.0	ns	
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF	1.0	-	12.5	ns	
	$V_{CC} = 4.5$ V to 5.5 V; $C_L = 15$ pF	1.0	-	8.5	ns	
	$V_{CC} = 3.0$ V to 3.6 V; $C_L = 50$ pF	1.0	-	16.5	ns	

[1] Typical values are measured at  $V_{CC} = 3.3$  V.[2] Typical values are measured at  $V_{CC} = 5.0$  V.

Table 11: Dynamic characteristics type 74AHCT2G241

GND = 0 V;  $t_r = t_f \leq 3.0$  ns; see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C [1]</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	see <a href="#">Figure 4</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	-	3.4	5.5	ns
		$C_L = 50$ pF	-	4.7	7.5	ns
$t_{PZH}$ , $t_{PZL}$	enable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	-	3.9	5.1	ns
		$C_L = 50$ pF	-	5.1	7.5	ns
	enable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	-	3.4	5.6	ns
		$C_L = 50$ pF	-	4.8	7.5	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	-	4.5	6.8	ns
		$C_L = 50$ pF	-	6.1	8.8	ns
	disable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	-	4.0	6.8	ns
		$C_L = 50$ pF	-	5.7	8.8	ns
<b><math>T_{amb} = -40</math> °C to +85 °C</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	see <a href="#">Figure 4</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	6.5	ns
		$C_L = 50$ pF	1.0	-	8.5	ns
$t_{PZH}$ , $t_{PZL}$	enable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	6.0	ns
		$C_L = 50$ pF	1.0	-	8.5	ns
	enable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	6.3	ns
		$C_L = 50$ pF	1.0	-	9.0	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	8.0	ns
		$C_L = 50$ pF	1.0	-	10.0	ns
	disable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	8.0	ns
		$C_L = 50$ pF	1.0	-	10.0	ns
<b><math>T_{amb} = -40</math> °C to +125 °C</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay nA to nY	see <a href="#">Figure 4</a> ; $V_{CC} = 4.5$ V to 5.5 V				
		$C_L = 15$ pF	1.0	-	7.0	ns
		$C_L = 50$ pF	1.0	-	9.5	ns

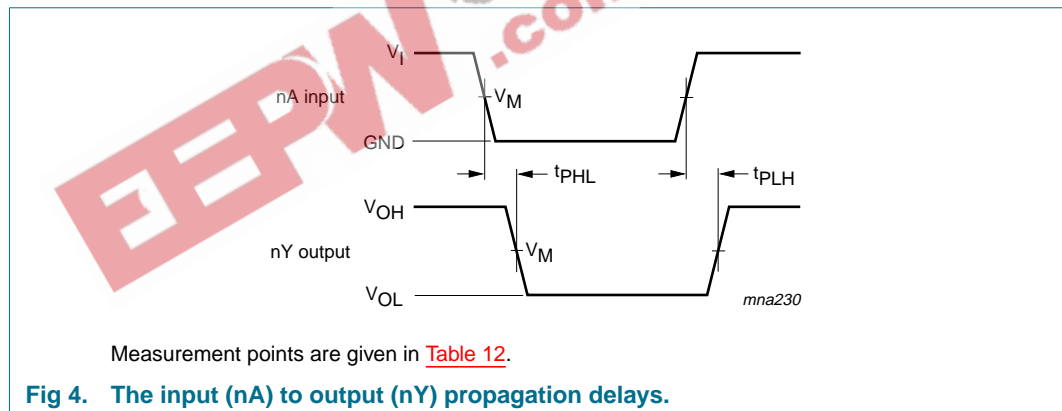
**Table 11: Dynamic characteristics type 74AHCT2G241 ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f \leq 3.0\text{ ns}$ ; see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{PZH}$ , $t_{PZL}$	enable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$				
		$C_L = 15\text{ pF}$	1.0	-	6.5	ns
		$C_L = 50\text{ pF}$	1.0	-	9.5	ns
	enable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$				
		$C_L = 15\text{ pF}$	1.0	-	6.5	ns
		$C_L = 50\text{ pF}$	1.0	-	9.5	ns
$t_{PHZ}$ , $t_{PLZ}$	disable time $\overline{1OE}$ to 1Y	see <a href="#">Figure 5</a> ; $V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$				
		$C_L = 15\text{ pF}$	1.0	-	8.5	ns
		$C_L = 50\text{ pF}$	1.0	-	11.0	ns
	disable time 2OE to 2Y	see <a href="#">Figure 6</a> ; $V_{CC} = 4.5\text{ V}$ to $5.5\text{ V}$				
		$C_L = 15\text{ pF}$	1.0	-	8.5	ns
		$C_L = 50\text{ pF}$	1.0	-	11.0	ns

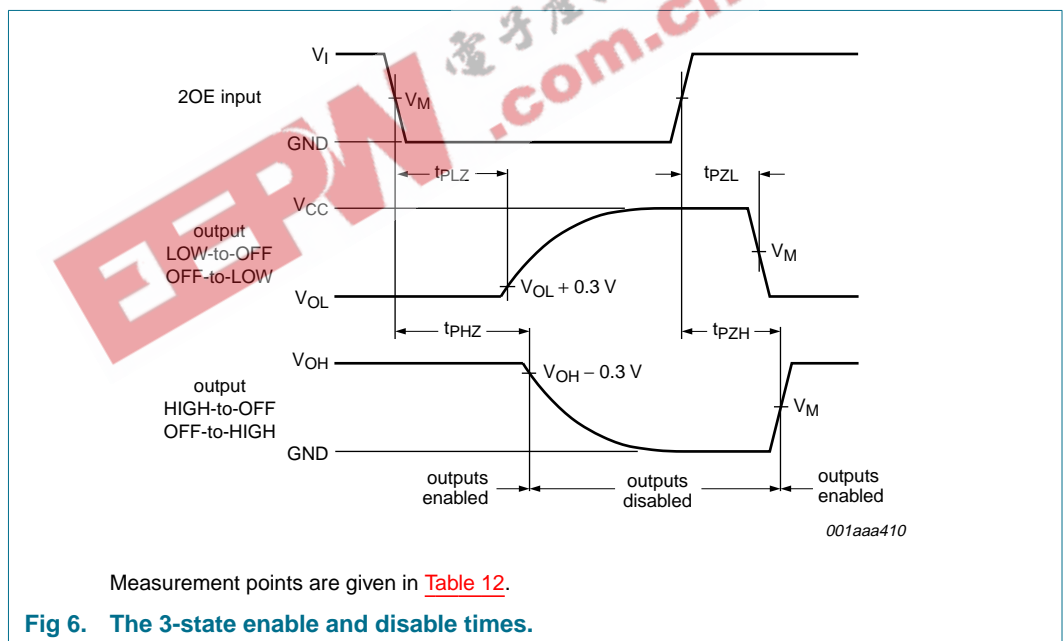
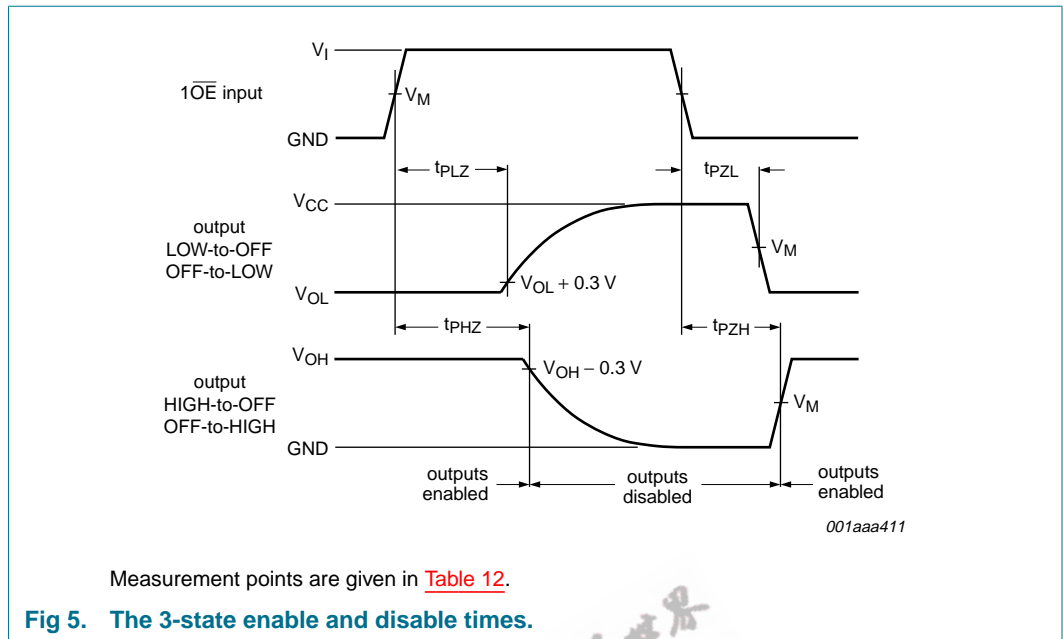
[1] All typical values are measured at  $V_{CC} = 5.0\text{ V}$ .

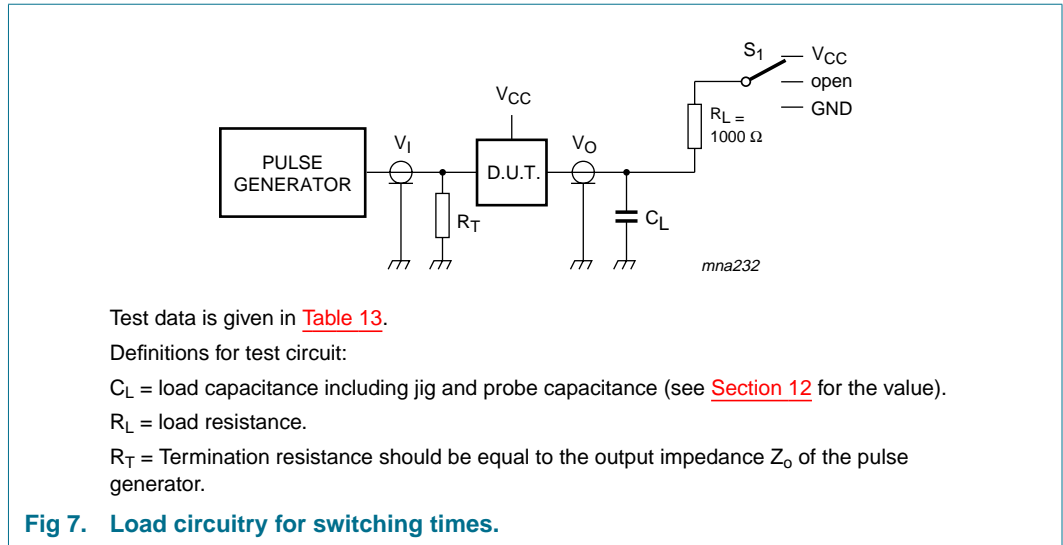
## 13. Waveforms



**Table 12: Measurement points**

Type	$V_I$ input requirements	$V_M$ input	$V_M$ output
74AHC2G241	$GND$ to $V_{CC}$	$50\% V_{CC}$	$50\% V_{CC}$
74AHCT2G241	$GND$ to $3.0\text{ V}$	$1.5\text{ V}$	$50\% V_{CC}$





**Table 13: Test data**

Test	$S_1$
$t_{PLH}$ , $t_{PHL}$	open
$t_{PLZ}$ , $t_{PZL}$	$V_{CC}$
$t_{PHZ}$ , $t_{PZH}$	GND

14. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

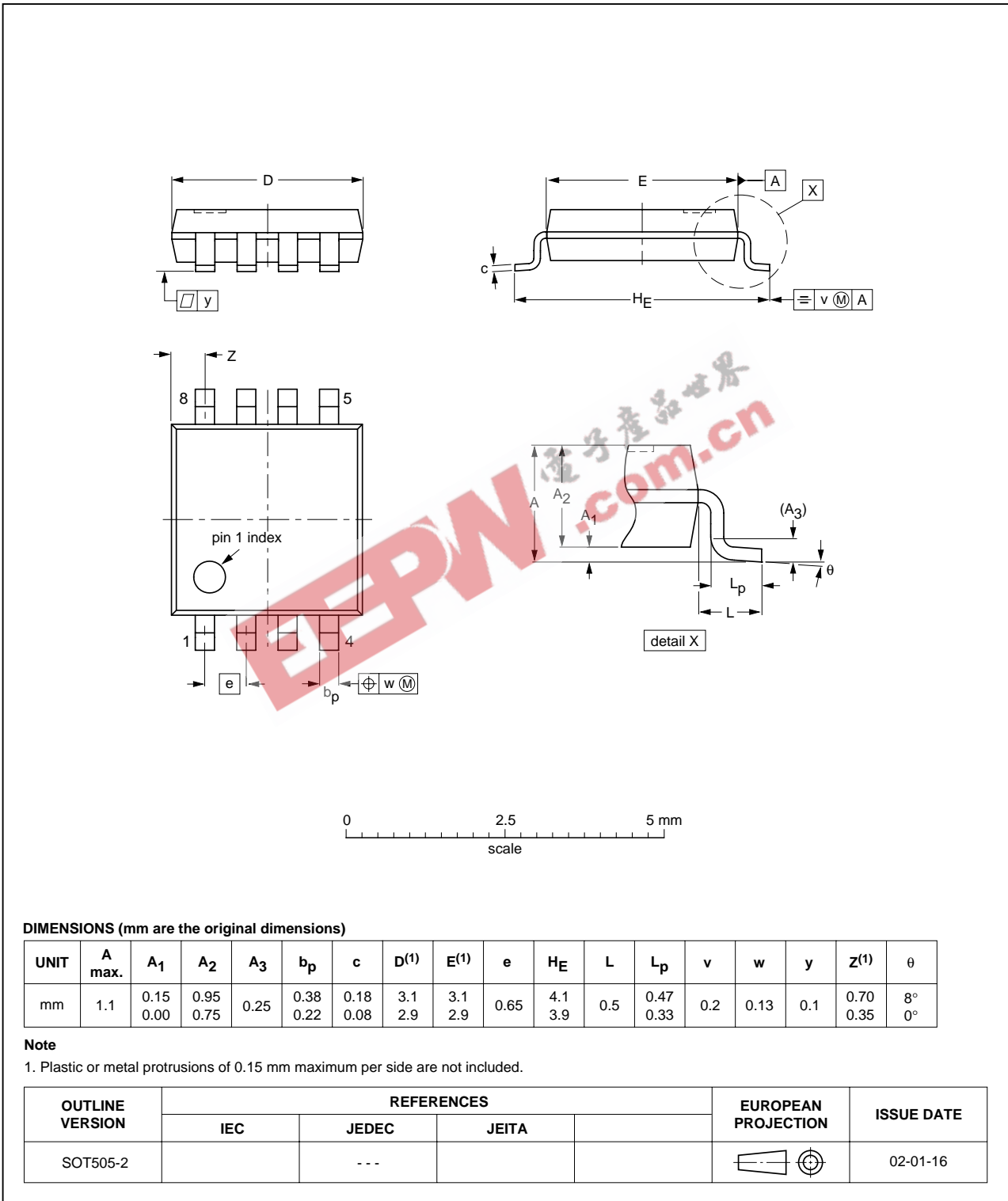


Fig 8. Package outline TSSOP8.

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1

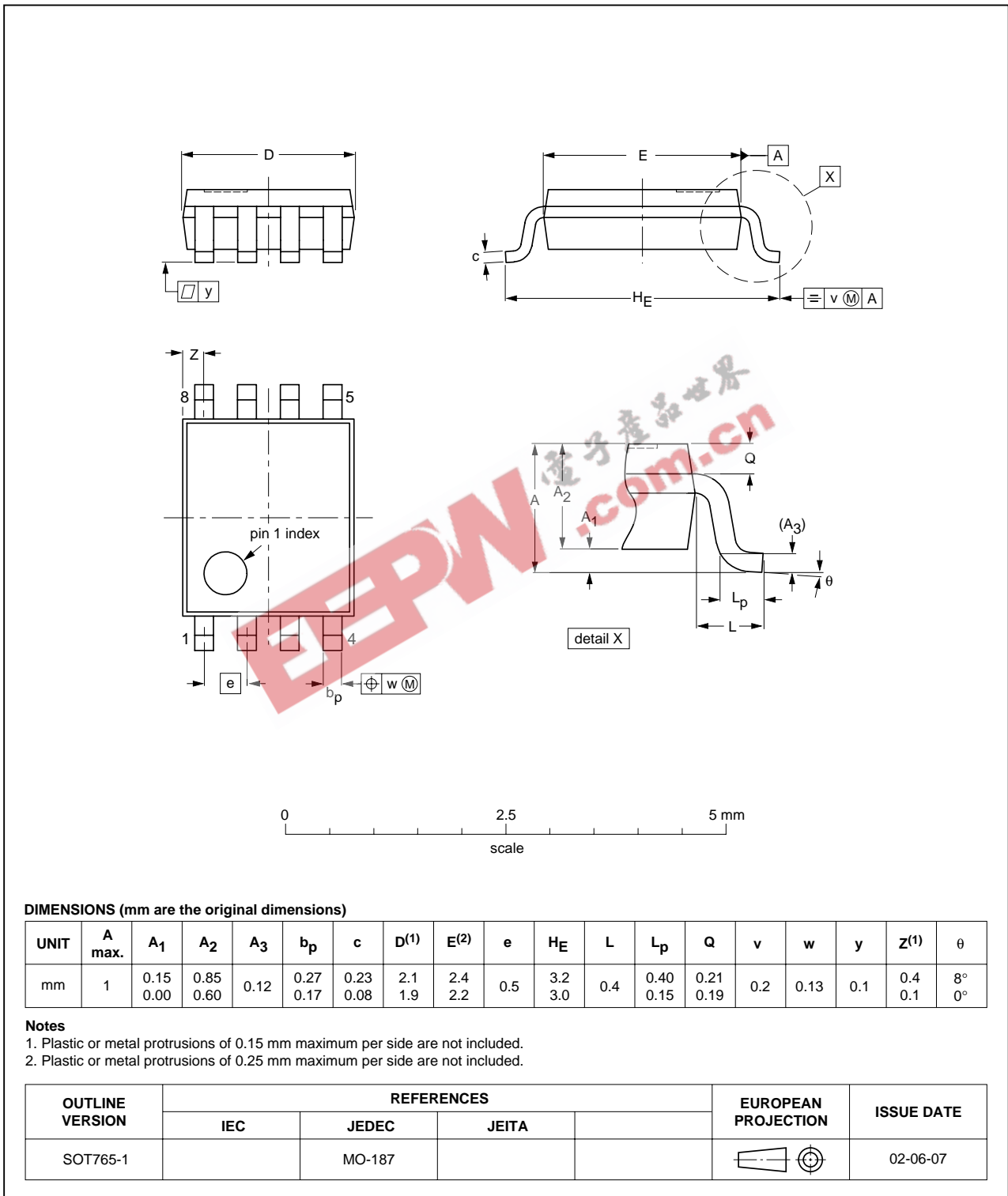


Fig 9. Package outline VSSOP8.



## 15. Revision history

Table 14: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
74AHC_AHCT2G241_1	20040310	Product data	-	9397 750 12887	-

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## 16. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[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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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 17. Definitions

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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