

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 |
|------------------------|-------------------------------------|---|-----|-----|-----|------|
| Type 74AHC2G241 | | | | | | |
| 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 | $C_L = 50\text{ pF}$; $f = 1\text{ MHz}$ ^{[1][2]} | - | 10 | - | pF |

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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 |
|-------------------------|-------------------------------|--|--------|-----|-----|------|
| Type 74AHCT2G241 | | | | | | |
| 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 μW). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$ 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

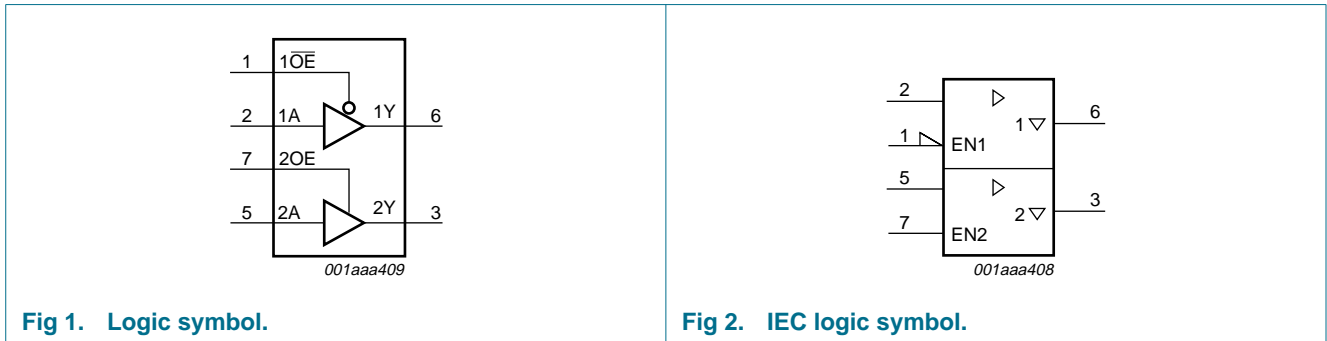
| Type number | Package | | | |
|---------------|-------------------|--------|---|----------|
| | Temperature range | Name | Description | Version |
| 74AHC2G241DP | -40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm | SOT505-2 |
| 74AHCT2G241DP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

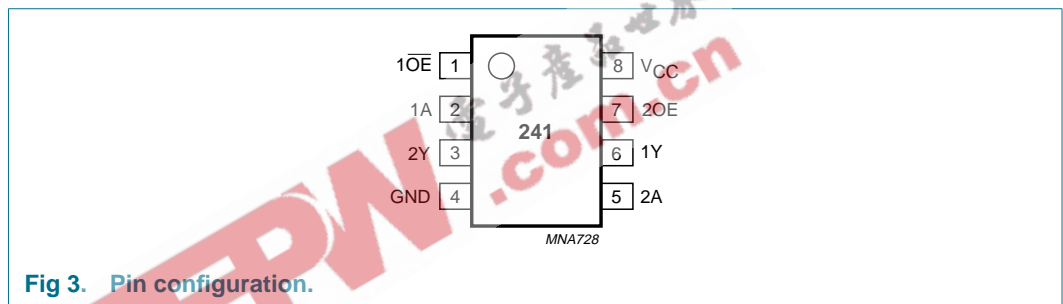
| Type number | Marking code |
|---------------|--------------|
| 74AHC2G241DP | A241 |
| 74AHCT2G241DP | C241 |
| 74AHC2G241DC | A41 |
| 74AHCT2G241DC | C41 |

6. Functional diagram



7. Pinning information

7.1 Pinning



7.2 Pin description

Table 4: Pin description

| Symbol | Pin | Description |
|-------------------|-----|-----------------------------------|
| 1 \overline{OE} | 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 _{CC} | 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 |
|-------------------------|-------------------------------|---|------|------|----------|------|
| Type 74AHC2G241 | | | | | | |
| 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 Section 11 and Section 12 | -40 | +25 | +125 | °C |
| t_r, t_f | input rise and fall times | $V_{CC} = 3.3$ V \pm 0.3 V | - | - | 100 | ns/V |
| | | $V_{CC} = 5$ V \pm 0.5 V | - | - | 20 | ns/V |
| Type 74AHCT2G241 | | | | | | |
| 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 |
|--|---|--|------|------|------|---------------|
| $T_{amb} = 25\text{ °C}$ | | | | | | |
| 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 | μA |
| I_{LI} | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$ | - | - | 0.1 | μA |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0\text{ A}; V_{CC} = 5.5\text{ V}$ | - | - | 1.0 | μA |
| C_I | input capacitance | | - | 1.5 | 10 | pF |
| $T_{amb} = -40\text{ °C to }+85\text{ °C}$ | | | | | | |
| 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 _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | - | 0.5 | V |
| | | V _{CC} = 3.0 V | - | - | 0.9 | V |
| | | V _{CC} = 5.5 V | - | - | 1.65 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | I _O = -50 µA; V _{CC} = 2.0 V | 1.9 | - | - | V |
| | | I _O = -50 µA; V _{CC} = 3.0 V | 2.9 | - | - | V |
| | | I _O = -50 µA; V _{CC} = 4.5 V | 4.4 | - | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.48 | - | - | 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 µA; V _{CC} = 2.0 V | - | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 3.0 V | - | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 4.5 V | - | - | 0.1 | V |
| | | I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.44 | 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 | µA |
| I _{LI} | input leakage current | V _I = V _{CC} or GND; V _{CC} = 5.5 V | - | - | 1.0 | µA |
| I _{CC} | quiescent supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 10 | µA |
| C _I | input capacitance | | - | - | 10 | pF |
| T_{amb} = -40 °C to +125 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 2.0 V | 1.5 | - | - | V |
| | | V _{CC} = 3.0 V | 2.1 | - | - | V |
| | | V _{CC} = 5.5 V | 3.85 | - | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 2.0 V | - | - | 0.5 | V |
| | | V _{CC} = 3.0 V | - | - | 0.9 | V |
| | | V _{CC} = 5.5 V | - | - | 1.65 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | I _O = -50 µA; V _{CC} = 2.0 V | 1.9 | - | - | V |
| | | I _O = -50 µA; V _{CC} = 3.0 V | 2.9 | - | - | V |
| | | I _O = -50 µA; V _{CC} = 4.5 V | 4.4 | - | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.40 | - | - | 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 µA; V _{CC} = 2.0 V | - | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 3.0 V | - | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 4.5 V | - | - | 0.1 | V |
| | | I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.55 | V |
| | | I _O = 8.0 mA; V _{CC} = 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 | μ A |
| I_{LI} | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | 2.0 | μ A |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 40 | μ 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 |
|--|---|--|------|-----|------|---------|
| $T_{amb} = 25$ °C | | | | | | |
| 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} | | | | |
| | | $I_O = -50$ μ 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} | | | | |
| | | $I_O = 50$ μ 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 | μ A |
| I_{LI} | input leakage current | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V | - | - | 0.1 | μ A |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 1.0 | μ A |
| ΔI_{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 |
| $T_{amb} = -40$ °C to +85 °C | | | | | | |
| 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} | | | | |
| | | $I_O = -50$ μ 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} | | | | |
| | | $I_O = 50$ μ 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 | μ 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 | μ A |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 10 | μ A |
| ΔI_{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 |
| $T_{amb} = -40$ °C to $+125$ °C | | | | | | |
| 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} | | | | |
| | | $I_O = -50$ μ 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} | | | | |
| | | $I_O = 50$ μ 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 | μ A |
| I_{LI} | input leakage current | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 5.5$ V | - | - | 2.0 | μ A |
| I_{CC} | quiescent supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 40 | μ A |
| ΔI_{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 |
|-------------------------------------|-------------------------------|--|-------|-----|------|------|
| $T_{amb} = 25$ °C | | | | | | |
| 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] - | 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 |
| | | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | [2] | - | 4.9 | 7.5 | 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 | |
| | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | [2] | - | 5.4 | 8.0 | 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 |
| | | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | [2] | - | 5.7 | 8.8 | 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 | |
| | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | [2] | - | 6.1 | 8.8 | ns | |
| $T_{amb} = -40$ °C to $+85$ °C | | | | | | | |
| 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 | |
| | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | 1.0 | - | 8.5 | ns | | |
| 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 | 1.0 | - | 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 | |
| | | $V_{CC} = 4.5$ V to 5.5 V; $C_L = 50$ pF | 1.0 | - | 8.5 | ns | |
| | enable time 2OE to 2Y | see Figure 6 | | | | | |
| | | $V_{CC} = 3.0$ V to 3.6 V; $C_L = 15$ pF | 1.0 | - | 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 | | |

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 |
| $T_{amb} = -40$ °C to $+125$ °C | | | | | | |
| 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 | - | 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 |
| 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 | 1.0 | - | 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 |
| 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 | | |

[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 |
|---|-------------------------------------|--|-----|-----|------|------|
| $T_{amb} = 25$ °C [1] | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay nA to nY | see Figure 4 ; $V_{CC} = 4.5$ 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 Figure 5 ; $V_{CC} = 4.5$ 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 Figure 6 ; $V_{CC} = 4.5$ 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 Figure 5 ; $V_{CC} = 4.5$ 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 Figure 6 ; $V_{CC} = 4.5$ V to 5.5 V | | | | |
| | | $C_L = 15$ pF | - | 4.0 | 6.8 | ns |
| | | $C_L = 50$ pF | - | 5.7 | 8.8 | ns |
| $T_{amb} = -40$ °C to +85 °C | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay nA to nY | see Figure 4 ; $V_{CC} = 4.5$ 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 Figure 5 ; $V_{CC} = 4.5$ 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 Figure 6 ; $V_{CC} = 4.5$ 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 Figure 5 ; $V_{CC} = 4.5$ 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 Figure 6 ; $V_{CC} = 4.5$ V to 5.5 V | | | | |
| | | $C_L = 15$ pF | 1.0 | - | 8.0 | ns |
| | | $C_L = 50$ pF | 1.0 | - | 10.0 | ns |
| $T_{amb} = -40$ °C to +125 °C | | | | | | |
| t_{PHL} , t_{PLH} | propagation delay nA to nY | see Figure 4 ; $V_{CC} = 4.5$ 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 Figure 5 ; $V_{CC} = 4.5\text{ V}$ to 5.5 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 Figure 6 ; $V_{CC} = 4.5\text{ V}$ to 5.5 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 Figure 5 ; $V_{CC} = 4.5\text{ V}$ to 5.5 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 Figure 6 ; $V_{CC} = 4.5\text{ V}$ to 5.5 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

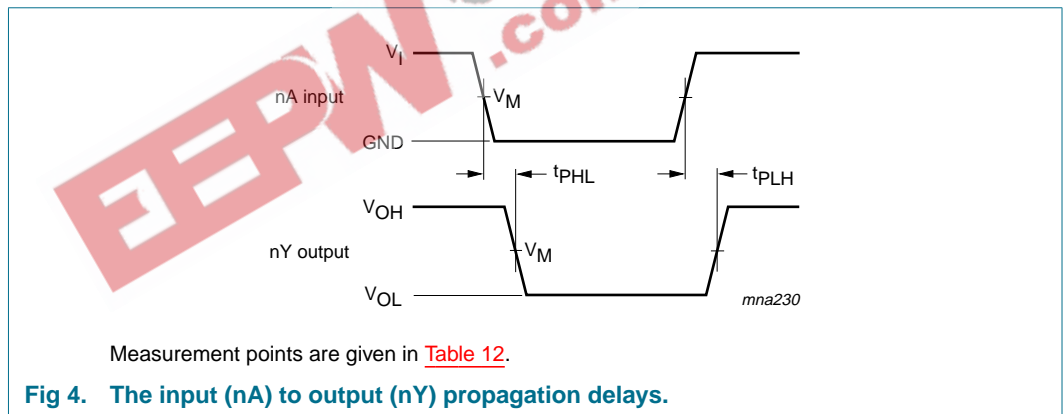
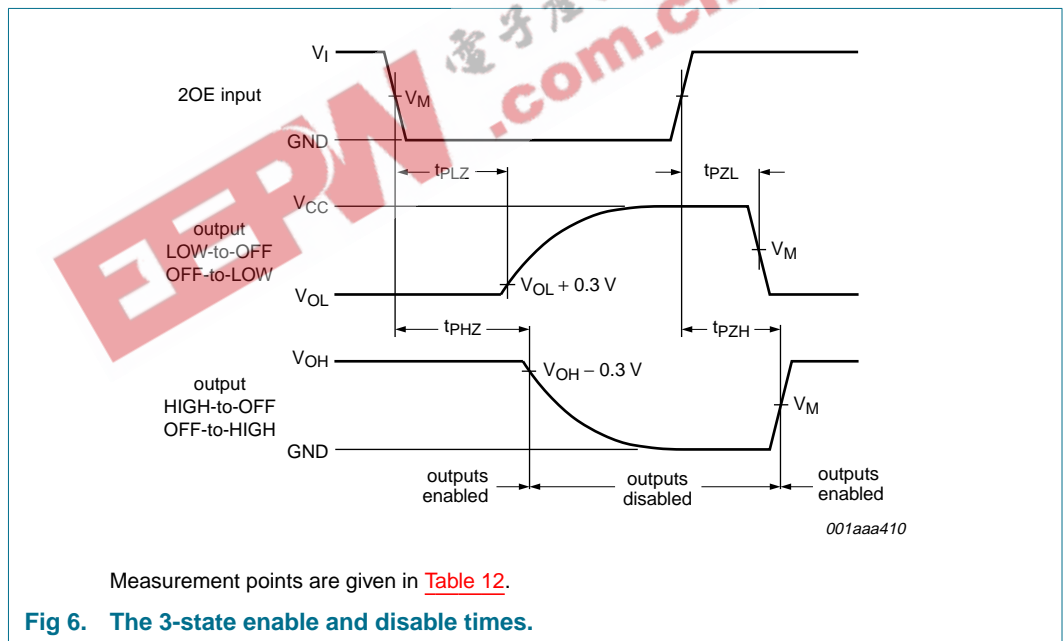
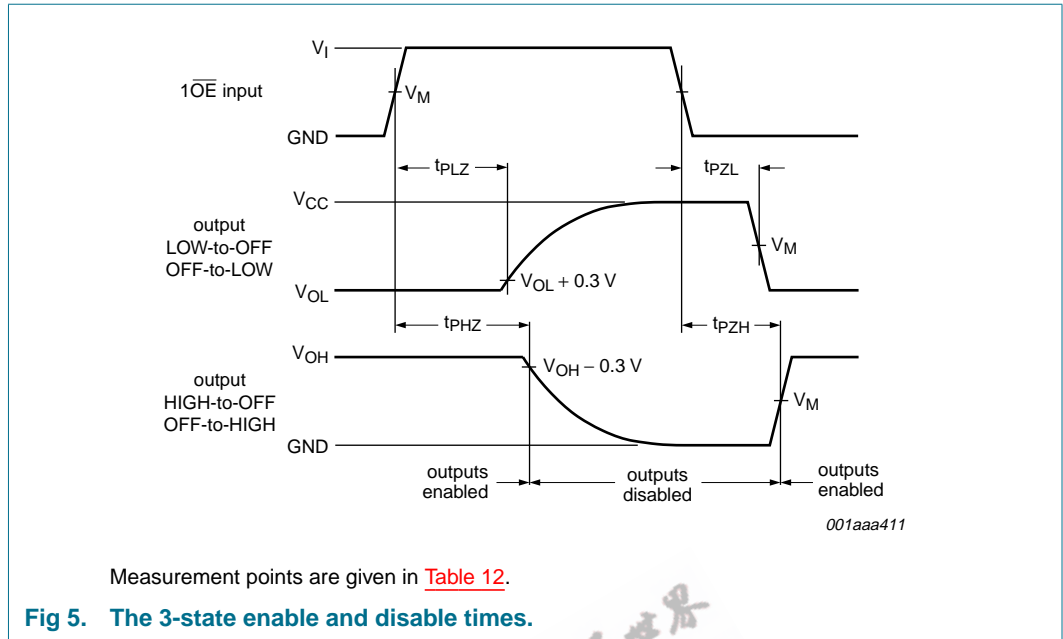


Table 12: Measurement points

| 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 V | 1.5 V | $50\% V_{CC}$ |



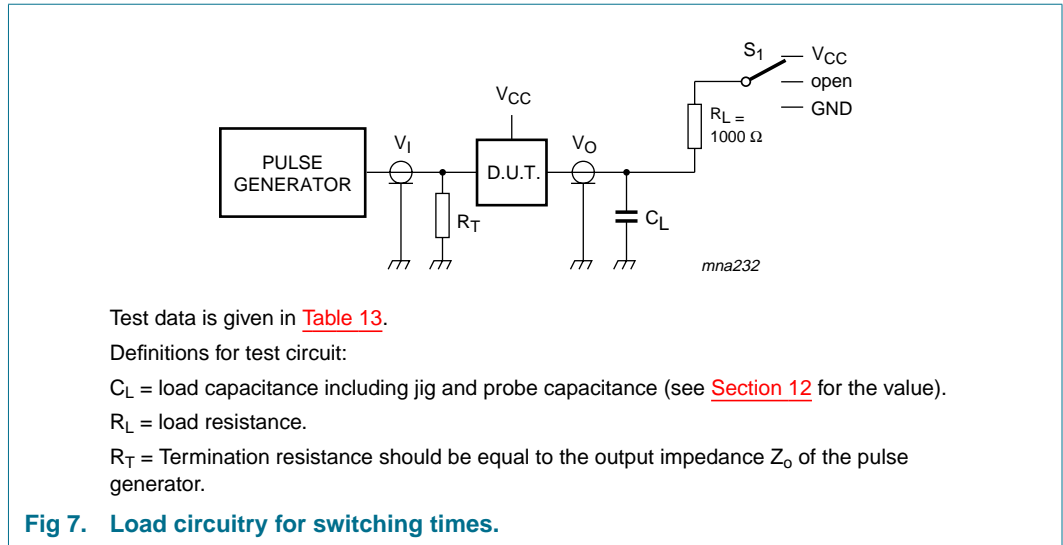


Table 13: Test data

| 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

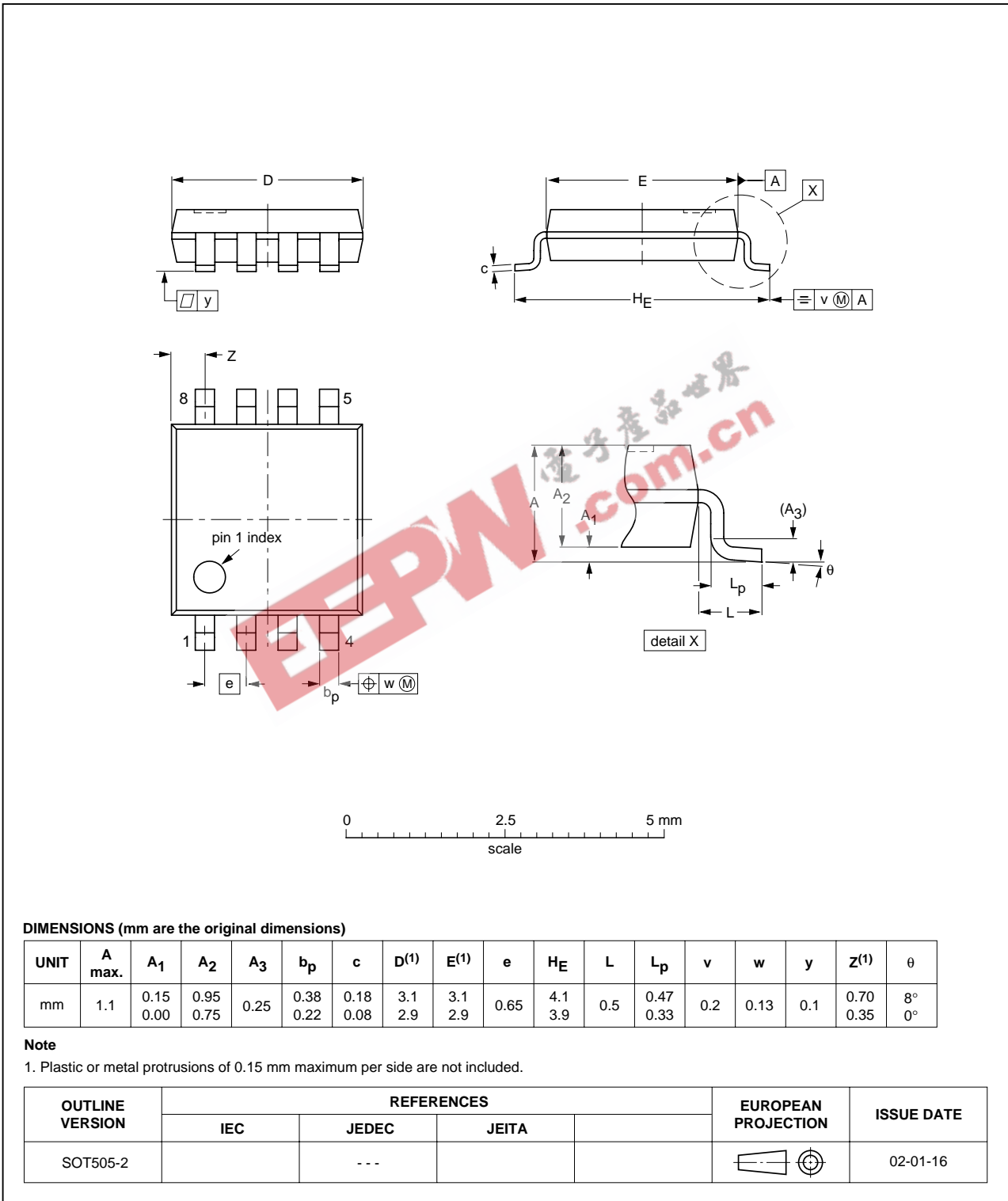


Fig 8. Package outline TSSOP8.

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

SOT765-1

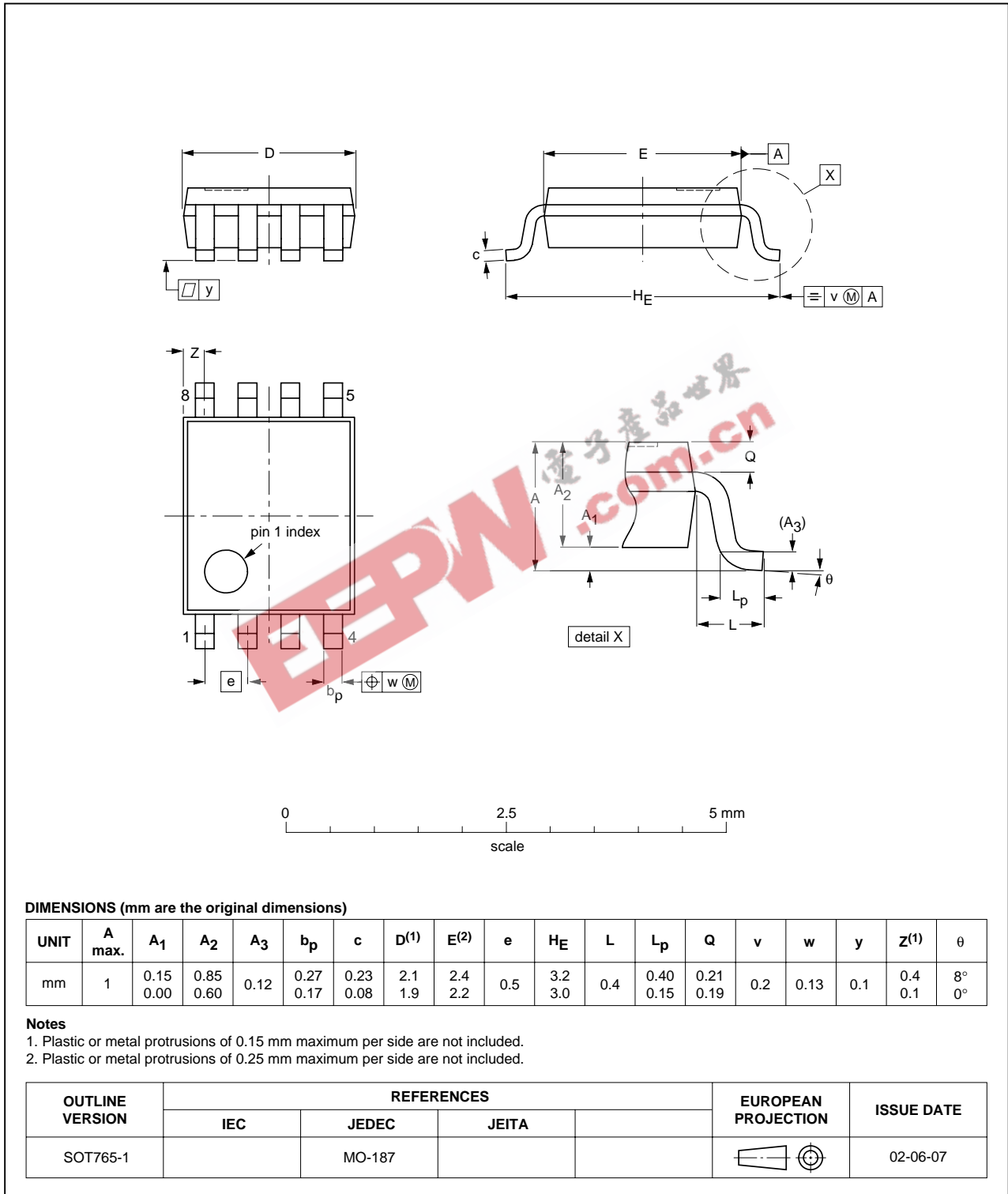


Fig 9. Package outline VSSOP8.

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 ^[1] | Product status ^[2] ^[3] | Definition |
|-------|----------------------------------|--|--|
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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For sales office addresses, send an email to: sales.addresses@www.semiconductors.philips.com

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