

74AHC2G125; 74AHCT2G125

Dual buffer/line driver; 3-state

Rev. 4 — 2 January 2019

Product data sheet

1. General description

The 74AHC2G125 and 74AHCT2G125 are high-speed Si-gate CMOS devices. They provide a dual non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input (nOE). A HIGH at nOE causes the output to assume a high-impedance OFF-state.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

2. Features and benefits

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- ESD protection:
 - HBM JESD22-A114E: exceeds 2000 V
 - MM JESD22-A115-A: exceeds 200 V
 - CDM JESD22-C101C: exceeds 1000 V
- Specified from -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

| Type number | Package | | | Version |
|---------------|-------------------|--------|--|----------|
| | Temperature range | Name | Description | |
| 74AHC2G125DP | -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 |
| 74AHCT2G125DP | | | | |
| 74AHC2G125DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74AHCT2G125DC | | | | |

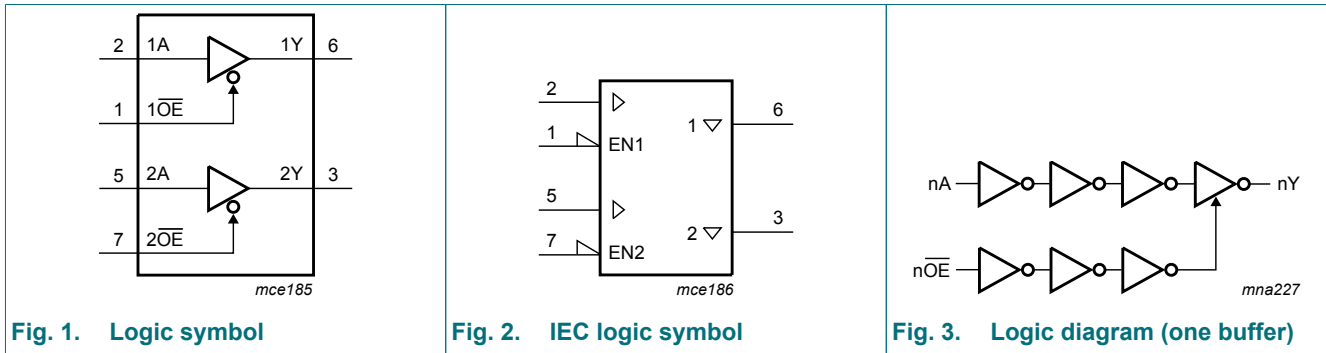
4. Marking

Table 2. Marking codes

| Type number | Marking ^[1] |
|---------------|------------------------|
| 74AHC2G125DP | A25 |
| 74AHCT2G125DP | C25 |
| 74AHC2G125DC | A25 |
| 74AHCT2G125DC | C25 |

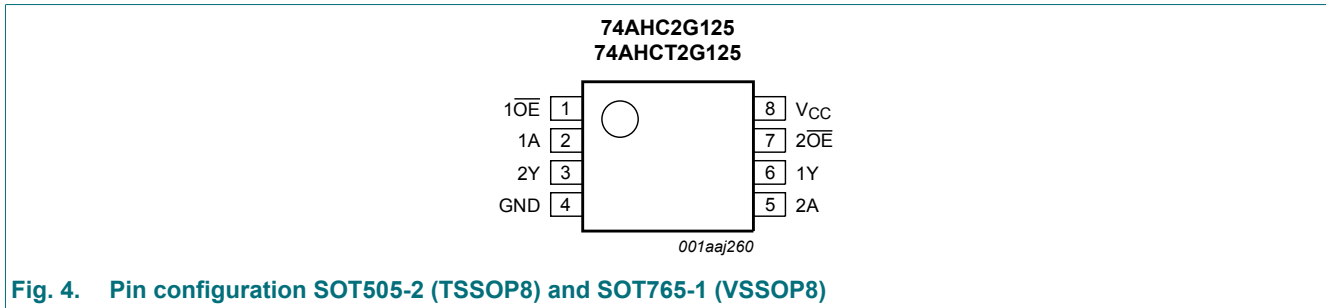
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|----------|------|----------------------------------|
| 1OE, 2OE | 1, 7 | output enable input (active LOW) |
| 1A, 2A | 2, 5 | data input |
| GND | 4 | ground (0 V) |
| 1Y, 2Y | 6, 3 | data output |
| VCC | 8 | supply voltage |

7. Functional description

Table 4. Function table

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

| Control | Input | Output |
|---------|-------|--------|
| nOE | nA | nY |
| L | L | L |
| L | H | H |
| H | X | Z |

8. Limiting values

Table 5. 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 clamping current | $V_I < -0.5$ V [1] | -20 | - | mA |
| I_{OK} | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V [1] | - | ±20 | mA |
| I_O | output current | -0.5 V < V_O < $V_{CC} + 0.5$ V | - | ±25 | mA |
| I_{CC} | supply current | | - | 75 | mA |
| I_{GND} | ground current | | -75 | - | mA |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| P_{tot} | total power dissipation | $T_{amb} = -40$ °C to +125 °C [2] | - | 250 | mW |

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

[2] For TSSOP8 package: above 55 °C the value of P_{tot} derates linearly with 2.5 mW/K.

For VSSOP8 package: above 110 °C the value of P_{tot} derates linearly with 8 mW/K.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | 74AHC2G125 | | | 74AHCT2G125 | | | Unit |
|---------------------|-------------------------------------|--------------------------|------------|-----|----------|-------------|-----|----------|------|
| | | | Min | Typ | Max | Min | Typ | Max | |
| V_{CC} | supply voltage | | 2.0 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | V |
| V_I | input voltage | | 0 | - | 5.5 | 0 | - | 5.5 | V |
| V_O | output voltage | | 0 | - | V_{CC} | 0 | - | V_{CC} | V |
| T_{amb} | ambient temperature | | -40 | +25 | +125 | -40 | +25 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 3.3$ V ± 0.3 V | - | - | 100 | - | - | - | ns/V |
| | | $V_{CC} = 5.0$ V ± 0.5 V | - | - | 20 | - | - | 20 | ns/V |

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-------------------|--------------------------|------------------|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| 74AHC2G125 | | | | | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 2.0$ V | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
| | | $V_{CC} = 3.0$ V | 2.1 | - | - | 2.1 | - | 2.1 | - | V |
| | | $V_{CC} = 5.5$ V | 3.85 | - | - | 3.85 | - | 3.85 | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 2.0$ V | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| | | $V_{CC} = 3.0$ V | - | - | 0.9 | - | 0.9 | - | 0.9 | V |
| | | $V_{CC} = 5.5$ V | - | - | 1.65 | - | 1.65 | - | 1.65 | V |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|--------------------|---------------------------|--|-------|-----|------|------------------|------|-------------------|------|------|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | | | | | |
| | | I _O = -50 µA; V _{CC} = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 3.0 V | 2.9 | 3.0 | - | 2.9 | - | 2.9 | - | V |
| | | I _O = -50 µA; V _{CC} = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.58 | - | - | 2.48 | - | 2.40 | - | V |
| | | I _O = -8.0 mA; V _{CC} = 4.5 V | 3.94 | - | - | 3.8 | - | 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 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 3.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 50 µA; V _{CC} = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| | | I _O = 8.0 mA; V _{CC} = 4.5 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _{OZ} | OFF-state output current | V _I = V _{CC} or GND; V _{CC} = 5.5 V | - | - | 0.25 | - | 2.5 | - | 10 | µA |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |
| 74AHCT2G125 | | | | | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 4.5 V to 5.5 V | 2.0 | - | - | 2.0 | - | 2.0 | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 4.5 V to 5.5 V | - | - | 0.8 | - | 0.8 | - | 0.8 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = -50 µA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -8.0 mA | 3.94 | - | - | 3.8 | - | 3.70 | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V | | | | | | | | |
| | | I _O = 50 µA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | I _O = 8.0 mA | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| I _{OZ} | OFF-state output current | V _I = V _{CC} or GND; V _{CC} = 5.5 V | - | - | 0.25 | - | 2.5 | - | 10 | µA |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | 0.1 | - | 1.0 | - | 2.0 | µA |
| I _{CC} | supply current | V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V | - | - | 1.0 | - | 10 | - | 40 | µA |
| ΔI _{CC} | additional 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 | - | 1.5 | - | 1.5 | mA |
| C _I | input capacitance | | - | 1.5 | 10 | - | 10 | - | 10 | pF |

11. Dynamic characteristics

Table 8. Dynamic characteristics
GND = 0 V; for test circuit see Fig. 7.

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|--------------------|-------------------------------|--|-------|---------|------|------------------|------|-------------------|------|------|
| | | | Min | Typ [1] | Max | Min | Max | Min | Max | |
| 74AHC2G125 | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Fig. 5 [2] | | | | | | | | |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF | - | 4.7 | 8.0 | 1.0 | 9.5 | 1.0 | 11.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF | - | 6.6 | 11.5 | 1.0 | 13.0 | 1.0 | 14.5 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 3.4 | 5.5 | 1.0 | 6.5 | 1.0 | 7.0 | ns |
| t _{en} | enable time | n $\bar{O}\bar{E}$ to nY; see Fig. 6 [2] | | | | | | | | |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF | - | 5.0 | 8.0 | 1.0 | 9.5 | 1.0 | 11.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF | - | 6.9 | 11.5 | 1.0 | 13.0 | 1.0 | 14.5 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 3.6 | 5.1 | 1.0 | 6.0 | 1.0 | 6.5 | ns |
| t _{dis} | disable time | n $\bar{O}\bar{E}$ to nY; see Fig. 6 [2] | | | | | | | | |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF | - | 6.0 | 9.7 | 1.0 | 11.5 | 1.0 | 12.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V; C _L = 50 pF | - | 8.3 | 13.2 | 1.0 | 15.0 | 1.0 | 16.5 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 4.1 | 6.8 | 1.0 | 8.0 | 1.0 | 8.5 | ns |
| C _{PD} | power dissipation capacitance | per buffer; C _L = 50 pF; f _i = 1 MHz; [3] V _I = GND to V _{CC} | - | 9 | - | - | - | - | - | pF |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF | - | 5.7 | 8.8 | 1.0 | 10.0 | 1.0 | 11.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 4.5 | 6.8 | 1.0 | 8.0 | 1.0 | 8.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF | - | 6.1 | 8.8 | 1.0 | 10.0 | 1.0 | 10.0 | ns |
| 74AHCT2G125 | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Fig. 5 [2] | | | | | | | | |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 3.4 | 5.5 | 1.0 | 6.5 | 1.0 | 6.5 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF | - | 4.8 | 7.5 | 1.0 | 8.5 | 1.0 | 8.5 | ns |
| t _{en} | enable time | n $\bar{O}\bar{E}$ to nY; see Fig. 6 [2] | | | | | | | | |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 3.9 | 5.1 | 1.0 | 6.0 | 1.0 | 6.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF | - | 5.1 | 7.5 | 1.0 | 8.5 | 1.0 | 8.5 | ns |
| t _{dis} | disable time | n $\bar{O}\bar{E}$ to nY; see Fig. 6 [2] | | | | | | | | |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 4.5 | 6.8 | 1.0 | 8.0 | 1.0 | 8.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 50 pF | - | 6.1 | 8.8 | 1.0 | 10.0 | 1.0 | 10.0 | ns |
| C _{PD} | power dissipation capacitance | per buffer; C _L = 50 pF; f _i = 1 MHz; [3] V _I = GND to V _{CC} | - | 11 | - | - | - | - | - | pF |
| | | V _{CC} = 4.5 V to 5.5 V; C _L = 15 pF | - | 4.5 | 6.8 | 1.0 | 8.0 | 1.0 | 8.0 | ns |

[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 3.3 V and 5.0 V respectively.

[2] t_{pd} is the same as t_{PLH} and t_{PHL}; t_{en} is the same as t_{PZL} and t_{PZH}; t_{dis} is the same as t_{PLZ} and t_{PHZ}.

[3] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

11.1. Waveforms and test circuit

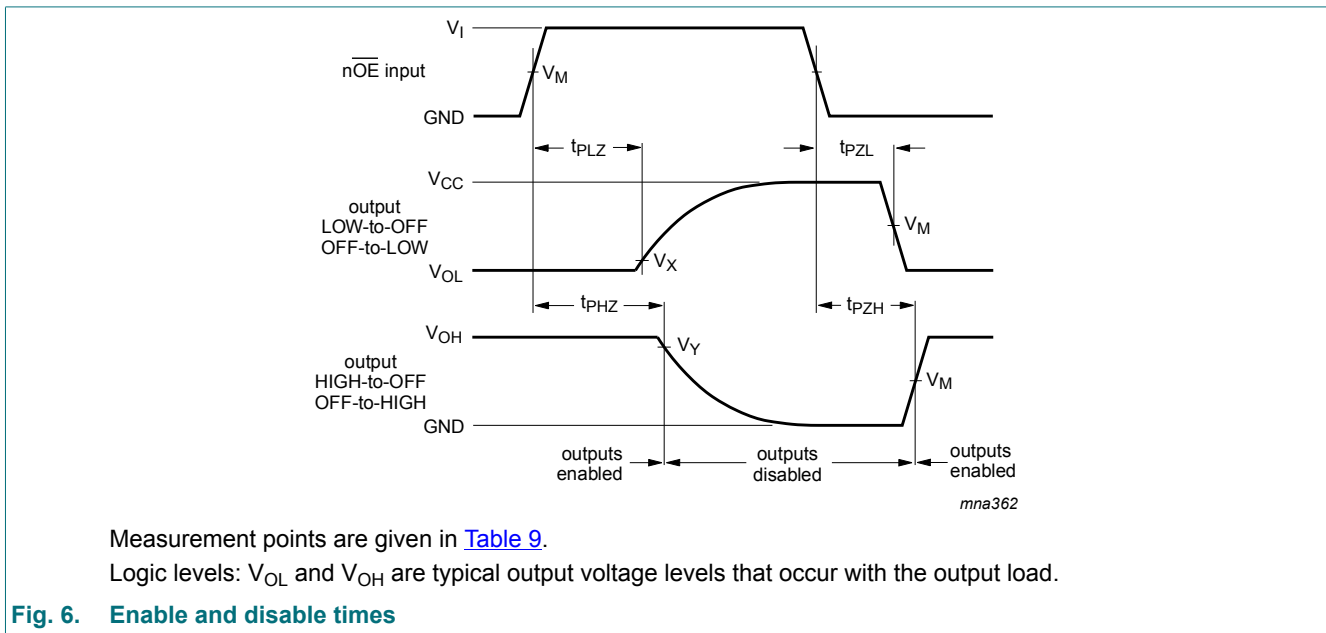
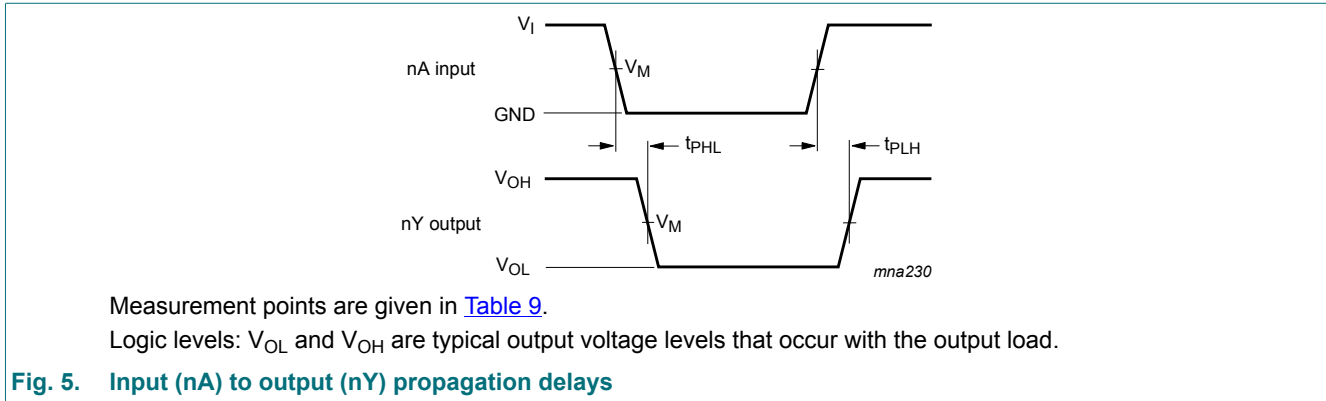


Table 9. Measurement points

| Type | Input | Output | | |
|-------------|-------------|-------------|------------------|------------------|
| | V_M | V_M | V_X | V_Y |
| 74AHC2G125 | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |
| 74AHCT2G125 | 1.5 V | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |

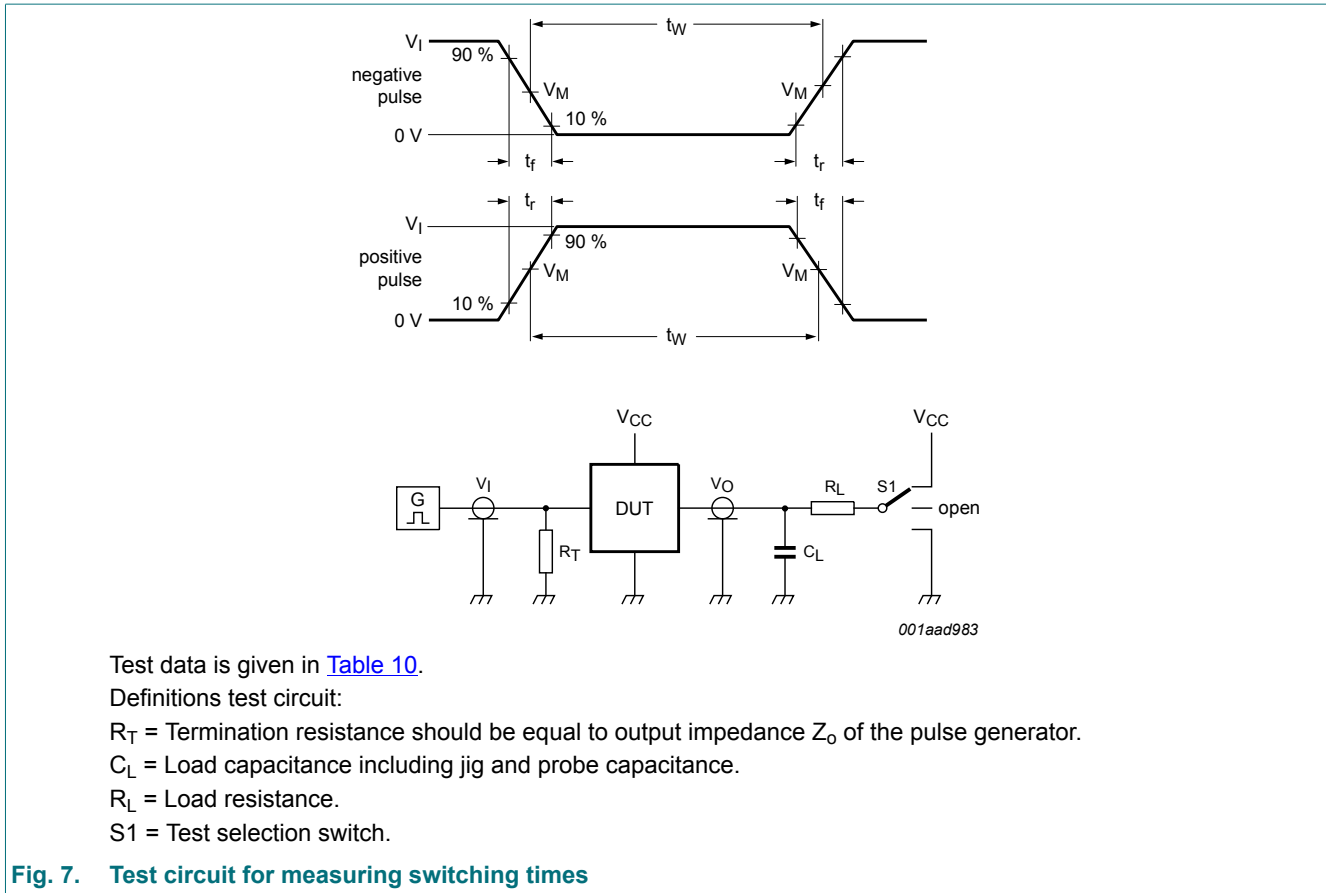


Table 10. Test data

| Type | Input | | Load | | S1 position | | |
|-------------|----------|-------------|--------------|--------------|--------------------|--------------------|--------------------|
| | V_I | t_r, t_f | C_L | R_L | t_{PHL}, t_{PLH} | t_{PZH}, t_{PHZ} | t_{PZL}, t_{PLZ} |
| 74AHC2G125 | V_{CC} | ≤ 3 ns | 15 pF, 50 pF | 1 k Ω | open | GND | V_{CC} |
| 74AHCT2G125 | 3 V | ≤ 3 ns | 15 pF, 50 pF | 1 k Ω | open | GND | V_{CC} |

12. 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 SOT505-2 (TSSOP8)

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

SOT765-1



Fig. 9. Package outline SOT765-1 (VSSOP8)

13. Abbreviations

Table 11. Abbreviations

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

14. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------------|--|-----------------------|---------------|---------------------|
| 74AHC_AHCT2G125 v.4 | 20190102 | Product data sheet | - | 74AHC_AHCT2G125 v.3 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Type numbers 74AHC2G125GD and 74AHCT2G125GD (SOT996-2) removed. Package outline drawing SOT765-1 (VSSOP8) updated. | | | |
| 74AHC_AHCT2G125 v.3 | 20130506 | Product data sheet | - | 74AHC_AHCT2G125 v.2 |
| Modifications: | <ul style="list-style-type: none"> For type number 74AHC2G125GD and 74AHCT2G125GD XSON8U has changed to XSON8. | | | |
| 74AHC_AHCT2G125 v.2 | 20081222 | Product data sheet | - | 74AHC_AHCT2G125 v.1 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. Legal texts have been adapted to the new company name where appropriate. Added type number 74AHC2G125GD and 74AHCT2G125GD (XSON8U package). | | | |
| 74AHC_AHCT2G125 v.1 | 20040113 | Product specification | - | - |

15. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

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