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Quad buffer/line driver; 3-state

Rev. 1 — 10 July 2012

Product data sheet

1. General description

The 74AHC126-Q100; 74AHCT126-Q100 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7A.

The 74AHC126-Q100; 74AHCT126-Q100 provides four non-inverting buffer/line drivers with 3-state outputs. The 3-state outputs (nY) are controlled by the output enable input (nOE). A LOW-level at pin nOE causes the outputs to assume a high-impedance OFF-state.

The 74AHC126-Q100; 74AHCT126-Q100 is identical to the 74AHC125-Q100; 74AHCT125-Q100 but has active HIGH output enable inputs.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Balanced propagation delays
- All inputs have Schmitt trigger action
- Inputs accept voltages higher than V_{CC}
- Input levels:
 - For 74AHC126-Q100: CMOS level
 - For 74AHCT126-Q100: TTL level
- ESD protection:
 - MIL-STD-883, method 3015 exceeds 2000 V
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V (C = 200 pf, R = 0 Ω)
- Multiple package options

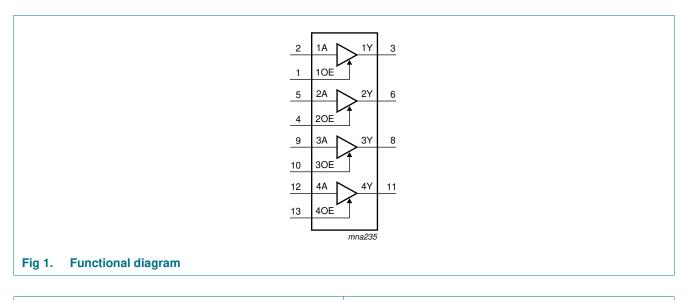
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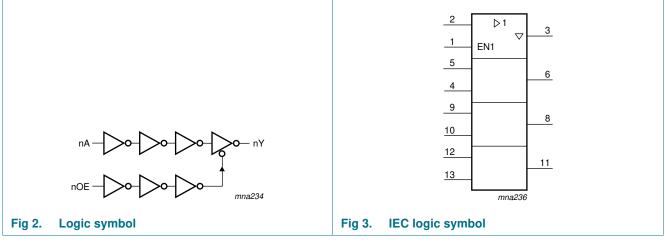
Quad buffer/line driver; 3-state

3. Ordering information

| Table 1. Ordering information Type number Package | | | | | | | | | |
|---|-------------------|----------|---|----------|--|--|--|--|--|
| | Temperature range | Name | Description | Version | | | | | |
| 74AHC126D-Q100 | –40 °C to +125 °C | SO14 | plastic small outline package; 14 leads; | SOT108-1 | | | | | |
| 74AHCT126D-Q100 | | | body width 3.9 mm | | | | | | |
| 74AHC126PW-Q100 | –40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; | SOT402-1 | | | | | |
| 74AHCT126PW-Q100 | | | body width 4.4 mm | | | | | | |
| 74AHC126BQ-Q100 | –40 °C to +125 °C | DHVQFN14 | | SOT762-1 | | | | | |
| 74AHCT126BQ-Q100 | | | very thin quad flat package; no leads; 14 terminals; body 2.5 \times 3 \times 0.85 mm | | | | | | |

4. Functional diagram

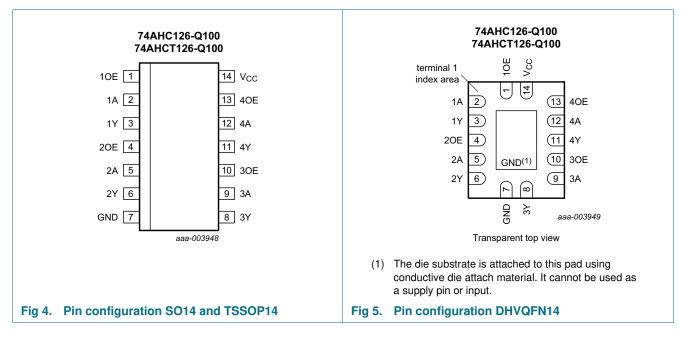




Quad buffer/line driver; 3-state

5. Pinning information

5.1 Pinning



5.2 Pin description

| Table 2. | Pin description | |
|-----------------|-----------------|-------------------------------------|
| Symbol | Pin | Description |
| 10E | 1 | output enable input 1 (active HIGH) |
| 1A | 2 | data input 1 |
| 1Y | 3 | data output 1 |
| 20E | 4 | output enable input 2 (active HIGH) |
| 2A | 5 | data input 2 |
| 2Y | 6 | data output 2 |
| GND | 7 | ground (0 V) |
| 3Y | 8 | data output 3 |
| 3A | 9 | data input 3 |
| 3OE | 10 | output enable input 3 (active HIGH) |
| 4Y | 11 | data output 4 |
| 4A | 12 | data input 4 |
| 40E | 13 | output enable input 4 (active HIGH) |
| V _{CC} | 14 | supply voltage |

Quad buffer/line driver; 3-state

6. Functional description

| Table 3. | Function table ^[1] | | |
|----------|-------------------------------|-------|--------|
| Control | | Input | Output |
| nOE | | nA | nY |
| Н | | L | L |
| Н | | Н | Н |
| L | | X | Z |

[1] H = HIGH voltage state;

L = LOW voltage state;

X = don't care;

Z = high-impedance OFF-state.

7. Limiting values

Table 4.Limiting values

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

| Parameter | Conditions | Min | Max | Unit |
|-------------------------|---|---|--|--|
| supply voltage | | -0.5 | +7.0 | V |
| input voltage | | -0.5 | +7.0 | V |
| input clamping current | $V_{I} < -0.5 V$ | <u>[1]</u> –20 | - | mA |
| output clamping current | $V_{\rm O}$ < –0.5 V or $V_{\rm O}$ > $V_{\rm CC}$ + 0.5 V | <u>[1]</u> –20 | +20 | mA |
| output current | $V_{\rm O}$ = –0.5 V to (V_{\rm CC} + 0.5 V) | -25 | +25 | mA |
| supply current | | - | +75 | mA |
| ground current | | -75 | - | mA |
| storage temperature | | -65 | +150 | °C |
| total power dissipation | $T_{amb} = -40 \text{ °C to } +125 \text{ °C}$ | [2] _ | 500 | mW |
| | supply voltage input voltage input clamping current output clamping current output current supply current ground current storage temperature | supply voltageinput voltageinput clamping current $V_1 < -0.5 V$ output clamping current $V_0 < -0.5 V$ or $V_0 > V_{CC} + 0.5 V$ output current $V_0 = -0.5 V$ to $(V_{CC} + 0.5 V)$ supply currentground currentstorage temperature | supply voltage -0.5 input voltage -0.5 input voltage -0.5 input clamping current $V_1 < -0.5$ V 11 -20 output clamping current $V_0 < -0.5$ V or $V_0 > V_{CC} + 0.5$ V 11 -20 output current $V_0 = -0.5$ V to $(V_{CC} + 0.5$ V) -25 supply current - - ground current -75 -65 | supply voltage -0.5 +7.0 input voltage -0.5 +7.0 input clamping current $V_1 < -0.5$ V 11 -20 - output clamping current $V_0 < -0.5$ V or $V_0 > V_{CC} + 0.5$ V 11 -20 +20 output current $V_0 = -0.5$ V to $(V_{CC} + 0.5$ V) -25 +25 supply current - +75 - ground current -75 - - storage temperature -65 +150 - |

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

[2] For SO14 packages: above 70 °C the value of P_{tot} derates linearly at 8 mW/K.

For TSSOP14 packages: above 60 °C the value of P_{tot} derates linearly at 5.5 mW/K. For DHVQFN14 packages: above 60 °C the value of P_{tot} derates linearly at 4.5 mW/K.

Quad buffer/line driver; 3-state

8. Recommended operating conditions

| Table 5. | Operating conditions | | | | | |
|-----------------------|-------------------------------------|--|-----|-----|-----------------|------|
| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
| 74AHC12 | 6-Q100 | | | | | |
| V _{CC} | supply voltage | | 2.0 | 5.0 | 5.5 | V |
| VI | input voltage | | 0 | - | 5.5 | V |
| Vo | output voltage | | 0 | - | V _{CC} | V |
| T _{amb} | ambient temperature | | -40 | +25 | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | e V _{CC} = 3.0 V to 3.6 V | - | - | 100 | ns/V |
| | | $V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$ | - | - | 20 | ns/V |
| 74AHCT1 | 26-Q100 | | | | | |
| V _{CC} | supply voltage | | 4.5 | 5.0 | 5.5 | V |
| VI | input voltage | | 0 | - | 5.5 | V |
| Vo | output voltage | | 0 | - | V _{CC} | V |
| T _{amb} | ambient temperature | | -40 | +25 | +125 | °C |
| $\Delta t / \Delta V$ | input transition rise and fall rate | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ | - | - | 20 | ns/V |

9. Static characteristics

Table 6. Static characteristics

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

| Symbol | Parameter | Conditions | | 25 °C | | -40 °C 1 | to +85 °C | –40 °C t | o +125 °C | Unit |
|----------------------------|------------------|---|------|-------|------|----------|-----------|----------|-----------|--|
| | | | Min | Тур | Max | Min | Max | Min | Max | V V V V V V V V V V V V V V V V V V |
| 74AHC1 | 26-Q100 | | | | | | | | | |
| V _{IH} HIGH-level | | V _{CC} = 2.0 V | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
| | input voltage | $V_{CC} = 3.0 V$ | 2.1 | - | - | 2.1 | - | 2.1 | - | V |
| | $V_{CC} = 5.5 V$ | 3.85 | - | - | 3.85 | - | 3.85 | - | V | |
| V _{IL} | LOW-level | $V_{CC} = 2.0 V$ | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| input voltage | $V_{CC} = 3.0 V$ | - | - | 0.9 | - | 0.9 | - | 0.9 | V | |
| | $V_{CC} = 5.5 V$ | - | - | 1.65 | - | 1.65 | - | 1.65 | V | |
| 011 | HIGH-level | $V_{I} = V_{IH} \text{ or } V_{IL}$ | | | | | | | | |
| | output voltage | $I_{O} = -50 \ \mu A; V_{CC} = 2.0 \ V$ | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | I_O = $-50~\mu\text{A};~V_{CC}$ = 3.0 V | 2.9 | 3.0 | - | 2.9 | - | 2.9 | - | V |
| | | $I_{O} = -50 \ \mu A; V_{CC} = 4.5 \ V$ | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$ | 2.58 | - | - | 2.48 | - | 2.40 | - | V |
| | | $I_{O} = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$ | 3.94 | - | - | 3.80 | - | 3.70 | - | V |
| V _{OL} | LOW-level | $V_{I} = V_{IH} \text{ or } V_{IL}$ | | | | | | | | |
| | output voltage | $I_{O} = 50 \ \mu A; V_{CC} = 2.0 \ V$ | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_{O} = 50 \ \mu A; V_{CC} = 3.0 \ V$ | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_{O} = 50 \ \mu A; V_{CC} = 4.5 \ V$ | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_{O} = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$ | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| | | I _O = 8.0 mA; V _{CC} = 4.5 V | - | - | 0.36 | - | 0.44 | - | 0.55 | V |

Quad buffer/line driver; 3-state

Table 6. Static characteristics ...continued

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

| Symbol | Parameter | Conditions | | 25 °C | | –40 °C | to +85 °C | –40 °C t | o +125 °C | Uni |
|---|---|---|------|-------|-------|--------|-----------|----------|-----------|-----|
| | | | Min | Тур | Max | Min | Max | Min | Max | |
| 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 |
| oz | OFF-state output current | $ \begin{array}{l} V_{I} = V_{IH} \text{ or } V_{IL}; \\ V_{O} = V_{CC} \text{ or } GND; \\ V_{CC} = 5.5 \ V \end{array} $ | - | - | ±0.25 | - | ±2.5 | - | ±10.0 | μA |
| сс | supply current | | - | - | 2.0 | - | 20 | - | 40 | μA |
| Cı | input capacitance | $V_I = V_{CC} \text{ or } GND$ | - | 3 | 10 | - | 10 | - | 10 | pF |
| Co | output capacitance | | - | 4 | - | - | - | - | - | pF |
| 74AHCT | 126-Q100 | | | | | | | | | |
| 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 | $V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$ | | | | | | | | | |
| | output voltage | I _O = -50 μA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | I _O = -8.0 mA | 3.94 | - | - | 3.80 | - | 3.70 | - | V |
| V _{OL} | LOW-level | V_{I} = V_{IH} or $V_{IL};V_{CC}$ = 4.5 V | | | | | | | | |
| | output voltage | I _O = 50 μA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | l _O = 8.0 mA | - | - | 0.36 | - | 0.44 | - | 0.55 | V |
| lı | input leakage current | | - | - | 0.1 | - | 1.0 | - | 2.0 | μA |
| loz | OFF-state output current | | - | - | ±0.25 | - | ±2.5 | - | ±10.0 | μA |
| l _{cc} | supply current | | - | - | 2.0 | - | 20 | - | 40 | μA |
| ∆I _{CC} | additional supply current | per input pin; $V_I = V_{CC} - 2.1 \text{ V}$; other pins at V_{CC} or GND; $I_O = 0 \text{ A}$; $V_{CC} = 4.5 \text{ V}$ to 5.5 V | - | - | 1.35 | - | 1.5 | - | 1.5 | mA |
| Cı | input capacitance | $V_{I} = V_{CC}$ or GND | - | 3 | 10 | - | 10 | - | 10 | pF |
| Co | output capacitance | | - | 4 | - | - | - | - | - | pF |

Quad buffer/line driver; 3-state

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8.

| Symbol | Parameter | Conditions | | | 25 °C | | –40 °C | to +85 °C | –40 °C | to +125 °C | Uni |
|-------------------------------|-------------------------------------|---|------------|-----|----------------------|------|--------|-----------|--------|------------|-----|
| | | | | Min | Typ <mark>[1]</mark> | Max | Min | Max | Min | Max | |
| 74AHC1 | 26-Q100 | | | | | | | | | | |
| t _{pd} | propagation | nA to nY; see Figure 6 | [2] | | | | | | | | |
| | delay | V_{CC} = 3.0 V to 3.6 V | | | | | | | | | |
| | | C _L = 15 pF | | - | 4.7 | 8.0 | 1.0 | 9.5 | 1.0 | 10.0 | ns |
| | | C _L = 50 pF | | - | 6.7 | 11.5 | 1.0 | 13.0 | 1.0 | 14.5 | ns |
| | | V_{CC} = 4.5 V to 5.5 V | | | | | | | | | |
| | | C _L = 15 pF | | - | 3.3 | 5.5 | 1.0 | 6.5 | 1.0 | 7.0 | ns |
| | | C _L = 50 pF | | - | 4.7 | 7.5 | 1.0 | 8.5 | 1.0 | 9.5 | ns |
| t _{en} enable time | | nOE to nY; see Figure 7 | [3] | | | | | | | | |
| | | V_{CC} = 3.0 V to 3.6 V | | | | | | | | | |
| | | C _L = 15 pF | | - | 5.3 | 8.0 | 1.0 | 9.5 | 1.0 | 10.0 | ns |
| | | C _L = 50 pF | | - | 7.6 | 11.5 | 1.0 | 13.0 | 1.0 | 14.5 | ns |
| | | V_{CC} = 4.5 V to 5.5 V | | | | | | | | | |
| | | C _L = 15 pF | | - | 3.6 | 5.3 | 1.0 | 6.1 | 1.0 | 7.0 | ns |
| | | C _L = 50 pF | | - | 5.1 | 7.6 | 1.0 | 8.7 | 1.0 | 9.5 | ns |
| t _{dis} disable time | disable time | nOE to nY; see Figure 7 | [4] | | | | | | | | |
| | | $V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$ | | | | | | | | | |
| | | C _L = 15 pF | | - | 6.6 | 9.7 | 1.0 | 11.5 | 1.0 | 12.5 | ns |
| | | C _L = 50 pF | | - | 9.4 | 13.2 | 1.0 | 15.0 | 1.0 | 16.5 | ns |
| | | $V_{CC} = 4.5 \text{ V}$ to 5.5 V | | | | | | | | | |
| | | C _L = 15 pF | | - | 4.7 | 6.8 | 1.0 | 8.0 | 1.0 | 8.5 | ns |
| | | C _L = 50 pF | | - | 6.7 | 8.8 | 1.0 | 10.0 | 1.0 | 11.0 | ns |
| C _{PD} | power dissipation capacitance | $f_i = 1 \text{ MHz};$ V ₁ = GND to V _{CC} | <u>[5]</u> | - | 10 | - | - | - | - | - | pF |
| 74AHCT | 126-Q100; V _C | _C = 4.5 V to 5.5 V | | | | | | | | | |
| t _{pd} | propagation | nA to nY; see Figure 6 | [2] | | | | | | | | |
| | delay | C _L = 15 pF | | - | 3.0 | 5.5 | 1.0 | 6.5 | 1.0 | 7.0 | ns |
| | | C _L = 50 pF | | - | 4.3 | 7.5 | 1.0 | 8.5 | 1.0 | 9.5 | ns |
| t _{en} | enable time | nOE to nY; see Figure 7 | [3] | | | | | | | | |
| | | C _L = 15 pF | | - | 3.3 | 5.1 | 1.0 | 6.0 | 1.0 | 6.5 | ns |
| | | C _L = 50 pF | | - | 4.7 | 7.1 | 1.0 | 8.0 | 1.0 | 9.0 | ns |
| t _{dis} | disable time | nOE to nY; see Figure 7 | <u>[4]</u> | | | | | | | | |
| | | C _L = 15 pF | | - | 4.8 | 6.8 | 1.0 | 8.0 | 1.0 | 8.5 | ns |
| | | C _L = 50 pF | | - | 6.9 | 8.9 | 1.0 | 10.0 | 1.0 | 11.5 | ns |
| C _{PD} | power dissipation capacitance | $f_i = 1 \text{ MHz};$ $V_1 = \text{GND to } V_{\text{CC}}$ | <u>[5]</u> | - | 12 | - | - | - | - | - | рF |

Nexperia

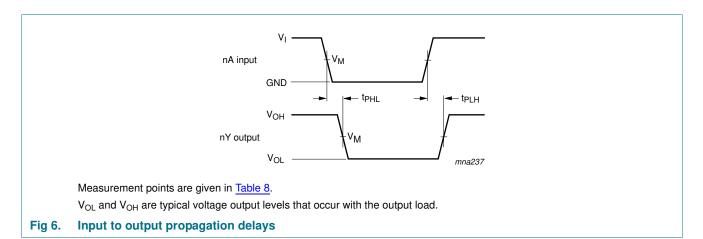
74AHC126-Q100; 74AHCT126-Q100

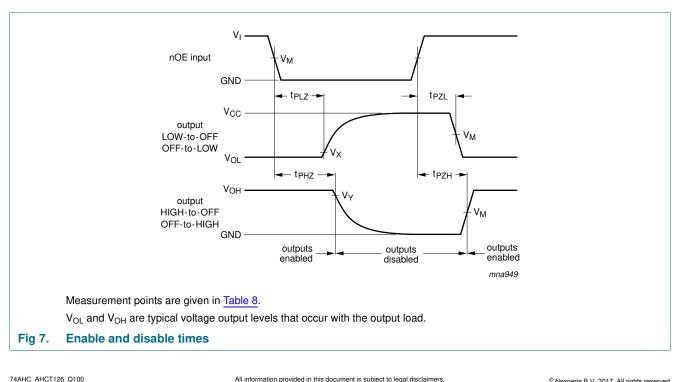
Quad buffer/line driver; 3-state

- Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V). [1]
- t_{pd} is the same as t_{PLH} and t_{PHL} . [2]
- ten is the same as tPZL and tPZH. [3]
- [4] t_{dis} is the same as t_{PLZ} and t_{PHZ} .
- [5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW). $P_{D} = C_{PD} \times V_{CC}^{2} \times f_{i} \times N + \Sigma (C_{L} \times V_{CC}^{2} \times f_{o}) \text{ where:}$ f_i = input frequency in MHz; fo = output frequency in MHz; C_L = output load capacitance in pF;
 - V_{CC} = supply voltage in V;
 - N = number of inputs switching;

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

11. Waveforms





Nexperia

74AHC126-Q100; 74AHCT126-Q100

Quad buffer/line driver; 3-state

| Table 8. Measurement points | | | | | | | |
|---------------------------------|--------------------|---------------------|-------------------------|-------------------------|--|--|--|
| Туре | Input | Output | | | | | |
| | V _M | V _M | V _X | V _Y | | | |
| 74AHC126-Q100 | $0.5\times V_{CC}$ | $0.5 \times V_{CC}$ | V _{OL} + 0.3 V | $V_{OH} - 0.3 V$ | | | |
| 74AHCT126-Q100 | 1.5 V | $0.5\times V_{CC}$ | V _{OL} + 0.3 V | V _{OH} – 0.3 V | | | |

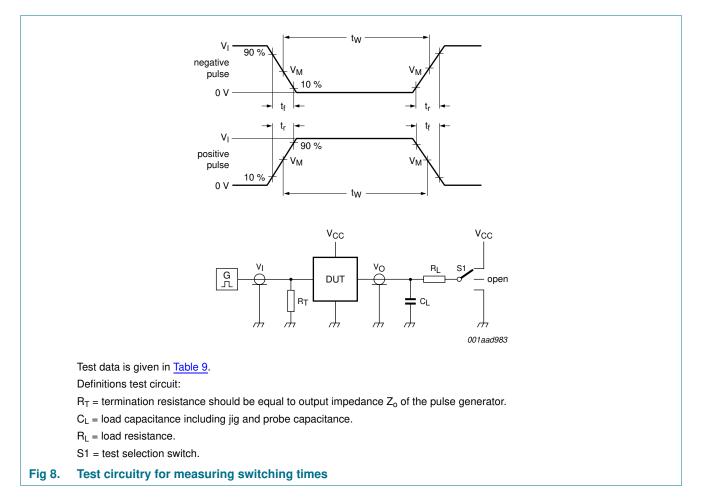


Table 9. Test data

| Туре | Input | | Load | | S1 position | | |
|----------------|-----------------|---------------------------------|--------------|------|-------------------------------------|-------------------------------------|-------------------------------------|
| | VI | t _r , t _f | CL | RL | t _{PHL} , t _{PLH} | t _{PZH} , t _{PHZ} | t _{PZL} , t _{PLZ} |
| 74AHC126-Q100 | V _{CC} | \leq 3.0 ns | 15 pF, 50 pF | 1 kΩ | open | GND | V _{CC} |
| 74AHCT126-Q100 | 3.0 V | \leq 3.0 ns | 15 pF, 50 pF | 1 kΩ | open | GND | V _{CC} |

Quad buffer/line driver; 3-state

12. Package outline

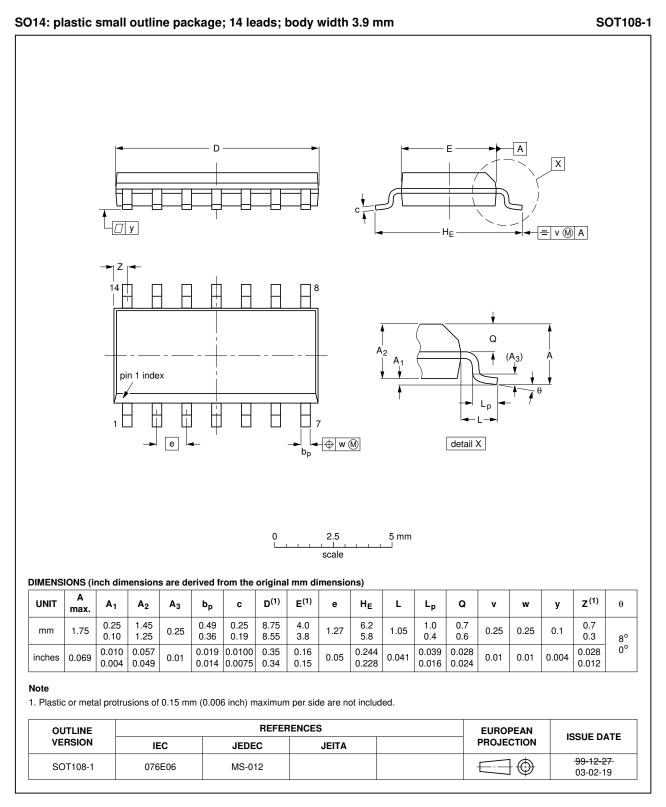


Fig 9. Package outline SOT108-1 (SO14)

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Quad buffer/line driver; 3-state

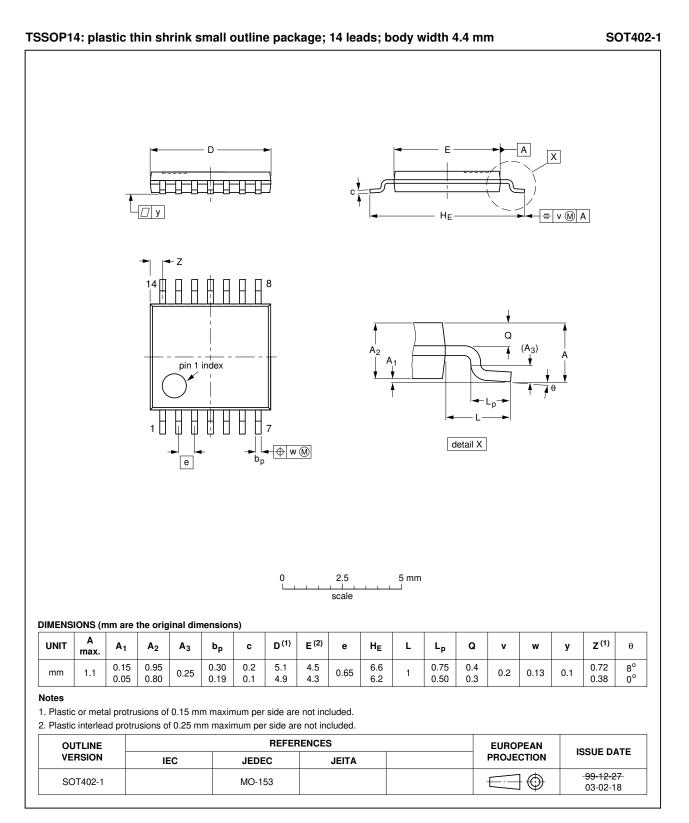
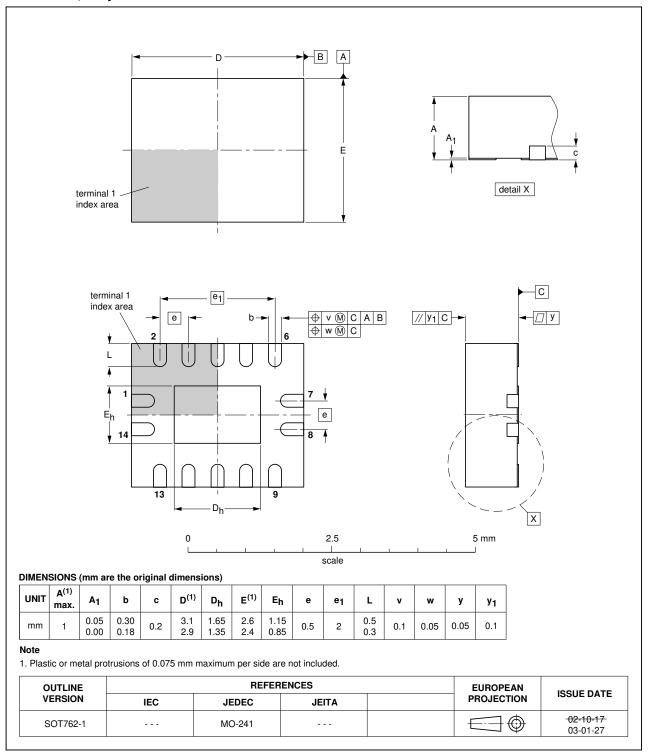


Fig 10. Package outline SOT402-1 (TSSOP14)

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Quad buffer/line driver; 3-state



DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm SOT762-1

Fig 11. Package outline SOT762-1 (DHVQFN14)

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Quad buffer/line driver; 3-state

13. Abbreviations

| AcronymDescriptionCDMCharged Device ModelCMOSComplementary Metal-Oxide SemiconductorDUTDevice Under TestESDElectroStatic DischargeHBMHuman Body ModelLSTTLLow-power Schottky Transistor-Transistor Logic | | Table 10. Abl |
|--|-------|---------------|
| CMOSComplementary Metal-Oxide SemiconductorDUTDevice Under TestESDElectroStatic DischargeHBMHuman Body Model | | Acronym |
| DUTDevice Under TestESDElectroStatic DischargeHBMHuman Body Model | | CDM |
| ESDElectroStatic DischargeHBMHuman Body Model |)r | CMOS |
| HBM Human Body Model | | DUT |
| | | ESD |
| LSTTL Low-power Schottky Transistor-Transistor Logic | | HBM |
| | logic | LSTTL |
| MM Machine Model | | MM |
| MIL Military | | MIL |

14. Revision history

| Table 11. Revision history | | | | |
|----------------------------|--------------|--------------------|---------------|------------|
| Document ID | Release date | Data sheet status | Change notice | Supersedes |
| 74AHC_AHCT126_Q100 v.1 | 20120710 | Product data sheet | - | - |

15. Legal information

15.1 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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74AHC_AHCT126_Q100
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Quad buffer/line driver; 3-state

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Nexperia

74AHC126-Q100; 74AHCT126-Q100

Quad buffer/line driver; 3-state

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