# 74ALVC14

## Hex inverting Schmitt trigger

Rev. 03 — 15 February 2005 Product data sheet

## 1. General description

The 74ALVC14 is a high-performance, low-power, low-voltage, Si-gate CMOS device and superior to most advanced CMOS compatible TTL families.

The 74ALVC14 provides six inverting buffers with Schmitt-trigger action. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

## 2. Features

- Wide supply voltage range from 1.65 V to 3.6 V
- 3.6 V tolerant inputs/outputs
- CMOS low power consumption
- Direct interface with TTL levels (2.7 V to 3.6 V)
- Power-down mode
- Unlimited input rise and fall times
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8-B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V
- Multiple package options

## 3. Quick reference data

**Table 1: Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{PHL}$, $t_{PLH}$ | propagation delay nA to nY | $V_{CC}$ = 1.8 V; $C_L$ = 30 pF; $R_L$ = 1 kΩ | - | 2.9 | - | ns |
| | | $V_{CC}$ = 2.5 V; $C_L$ = 30 pF; $R_L$ = 500 Ω | - | 2.2 | - | ns |
| | | $V_{CC}$ = 2.7 V; $C_L$ = 50 pF; $R_L$ = 500 Ω | - | 2.8 | - | ns |
| | | $V_{CC}$ = 3.3 V; $C_L$ = 50 pF; $R_L$ = 500 Ω | - | 2.4 | - | ns |

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**Table 1: Quick reference data** *…continued*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $C_I$ | input capacitance | | | - | 3.5 | - | pF |
| $C_{PD}$ | power dissipation capacitance per buffer | $V_{CC}$ = 3.3 V | [1] [2] | - | 25 | - | pF |

[1] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[2] The condition is $V_I$ = GND to $V_{CC}$.

## 4. Ordering information

**Table 2: Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74ALVC14D | –40 °C to +85 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74ALVC14PW | –40 °C to +85 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |
| 74ALVC14BQ | –40 °C to +85 °C | DHVQFN14 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm | SOT762-1 |


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## 5. Functional diagram

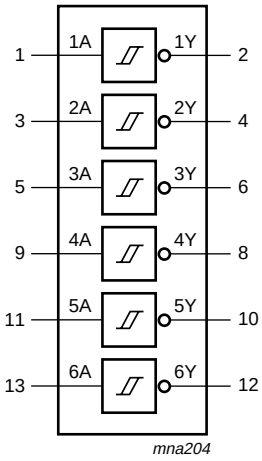



Fig 1. Logic symbol

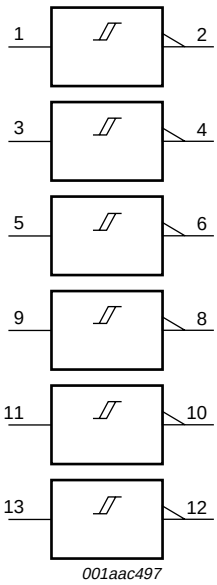



Fig 2. IEC logic symbol

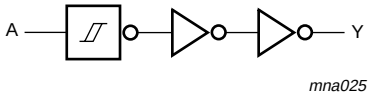



Fig 3. Logic diagram (one Schmitt trigger)



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# 6. Pinning information

## 6.1 Pinning

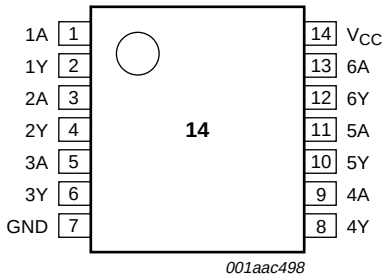
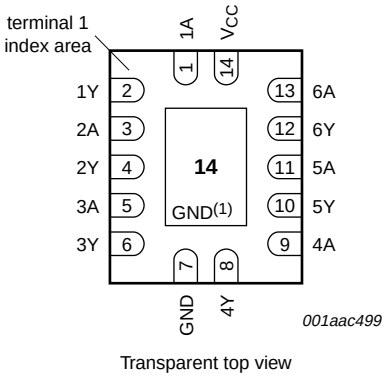



Fig 4. Pin configuration SO14 and TSSOP14




Transparent top view

The die substrate is attached to the exposed die pad using conductive die attach material. It can not be used as a supply pin or input.

Fig 5. Pin configuration DHVQFN14

## 6.2 Pin description

Table 3: Pin description

| Symbol | Pin | Description |
|---|---|---|
| 1A | 1 | 1 data input A |
| 1Y | 2 | 1 data output Y |
| 2A | 3 | 2 data input A |
| 2Y | 4 | 2 data output Y |
| 3A | 5 | 3 data input A |
| 3Y | 6 | 3 data output Y |
| GND | 7 | ground (0 V) |
| 4Y | 8 | 4 data output Y |
| 4A | 9 | 4 data input A |
| 5Y | 10 | 5 data output Y |
| 5A | 11 | 5 data input A |
| 6Y | 12 | 6 data output Y |
| 6A | 13 | 6 data input A |
| $V_{CC}$ | 14 | supply voltage |


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# 7. Functional description

## 7.1 Function table

**Table 4: Function table [1]**

| Input | Output |
|---|---|
| **nA** | **nY** |
| L | H |
| H | L |

[1] H = HIGH voltage level;
L = LOW voltage level.

# 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 | +4.6 | V |
| $V_I$ | input voltage | | [1] | –0.5 | +4.6 | V |
| $V_O$ | output voltage | Active mode | [1] | –0.5 | $V_{CC}$ + 0.5 | V |
| | | Power-down mode | [2] | –0.5 | +4.6 | V |
| $I_{IK}$ | input diode current | $V_I$ < 0 V | | - | –50 | mA |
| $I_{OK}$ | output diode current | $V_O$ > $V_{CC}$ or $V_O$ < 0 V | | - | ±50 | mA |
| $I_O$ | output source or sink current | $V_O$ = 0 V to $V_{CC}$ | | - | ±50 | mA |
| $I_{CC}$, $I_{GND}$ | $V_{CC}$ or GND current | | | - | ±100 | mA |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = –40 °C to +85 °C | [3] | - | 500 | mW |

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

[2] When $V_{CC}$ = 0 V (Power-down mode), the output voltage can be 3.6 V in normal operation.

[3] For SO14 packages: $P_{tot}$ derates linearly with 8 mW/K above 70 °C.
For TSSOP14 packages: $P_{tot}$ derates linearly with 5.5 mW/K above 60 °C.
For DHVQFN14 packages: $P_{tot}$ derates linearly with 4.5 mW/K above 60 °C.


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## 9. Recommended operating conditions

**Table 6: Recommended operating conditions**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 1.65 | - | 3.6 | V |
| $V_I$ | input voltage | | 0 | - | 3.6 | V |
| $V_O$ | output voltage | $V_{CC}$ = 1.65 V to 3.6 V | 0 | - | $V_{CC}$ | V |
| | | Power-down mode; $V_{CC}$ = 0 V | 0 | - | 3.6 | V |
| $T_{amb}$ | ambient temperature | | –40 | - | +85 | °C |

## 10. Static characteristics

**Table 7: Static characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +85 °C [1]** | | | | | | |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = 100 µA; $V_{CC}$ = 1.65 V to 3.6 V | - | - | 0.2 | V |
| | | $I_O$ = 6 mA; $V_{CC}$ = 1.65 V | - | 0.11 | 0.3 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 2.3 V | - | 0.17 | 0.4 | V |
| | | $I_O$ = 18 mA; $V_{CC}$ = 2.3 V | - | 0.25 | 0.6 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 2.7 V; | - | 0.16 | 0.4 | V |
| | | $I_O$ = 18 mA; $V_{CC}$ = 3.0 V | - | 0.23 | 0.4 | V |
| | | $I_O$ = 24 mA; $V_{CC}$ = 3.0 V | - | 0.30 | 0.55 | V |
| $V_{OH}$ | HIGH-level voltage output | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = –100 µA; $V_{CC}$ = 1.65 V to 3.6 V | $V_{CC}$ – 0.2 | - | - | V |
| | | $I_O$ = –6 mA; $V_{CC}$ = 1.65 V | 1.25 | 1.51 | - | V |
| | | $I_O$ = –12 mA; $V_{CC}$ = 2.3 V | 1.8 | 2.10 | - | V |
| | | $I_O$ = –18 mA; $V_{CC}$ = 2.3 V | 1.7 | 2.01 | - | V |
| | | $I_O$ = –12 mA; $V_{CC}$ = 2.7 V; | 2.2 | 2.53 | - | V |
| | | $I_O$ = –18 mA; $V_{CC}$ = 3.0 V | 2.4 | 2.76 | - | V |
| | | $I_O$ = –24 mA; $V_{CC}$ = 3.0 V | 2.2 | 2.68 | - | V |
| $I_{LI}$ | input leakage current | $V_{CC}$ = 3.6 V; $V_I$ = 3.6 V or GND | - | ±0.1 | ±5 | µA |
| $I_{off}$ | power-off leakage current | $V_{CC}$ = 0 V; $V_I$ or $V_O$ = 3.6 V | - | ±0.1 | ±10 | µA |
| $I_{CC}$ | quiescent supply current | $V_{CC}$ = 3.6 V; $V_I$ = $V_{CC}$ or GND; $I_O$ = 0 A | - | 0.2 | 10 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current per input pin | $V_{CC}$ = 3.0 V to 3.6 V; $V_I$ = $V_{CC}$ – 0.6 V; $I_O$ = 0 A | - | 5 | 750 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | pF |

[1] Typical values are measured at $T_{amb}$ = 25 °C.



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## 11. Dynamic characteristics

**Table 8: Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 7.*

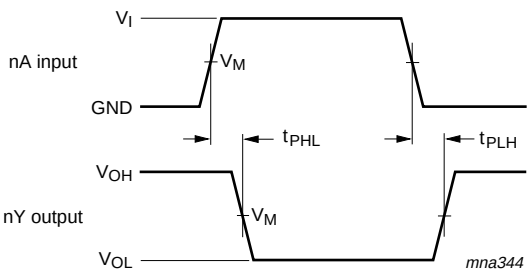
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **$T_{amb}$ = −40 °C to +85 °C** [1] | | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | propagation delay nA to nY | see Figure 6 | | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | | 1.0 | 2.9 | 4.4 | ns |
| | | $V_{CC}$ = 1.95 V to 2.7 V | | 1.0 | 2.2 | 3.7 | ns |
| | | $V_{CC}$ = 2.7 V | | 1.0 | 2.8 | 3.9 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 1.0 | 2.4 | 3.4 | ns |
| $C_{PD}$ | power dissipation capacitance per buffer | $V_{CC}$ = 3.3 V | [2] [3] | - | 25 | - | pF |

[1] Typical values are measured at $T_{amb}$ = 25 °C.

[2] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[3] The condition is $V_I$ = GND to $V_{CC}$.

## 12. Waveforms



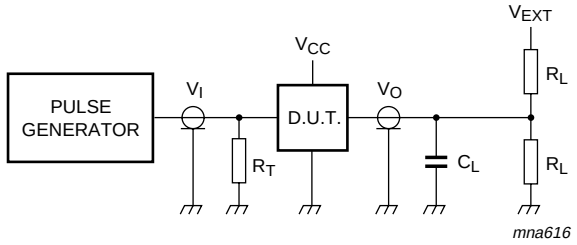

$V_{OL}$ and $V_{OH}$ are typical output voltage drop that occur with the output load.

**Fig 6. Propagation delay input (nA) to output (nY)**

**Table 9: Measurement points**

| Supply | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.65 V to 1.95 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 2.3 V to 2.7 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 2.7 V | 1.5 V | 1.5 V |
| 3.0 V to 3.6 V | 1.5 V | 1.5 V |


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Test data is given in Table 9.

Definitions test circuit:

$R_T$ = Termination resistance should be equal to output impedance $Z_o$ of the pulse generator.

$C_L$ = Load capacitance including jig and probe capacitance.

$R_L$ = Load resistor.

$V_{EXT}$ = Test voltage for switching times.

**Fig 7. Load circuitry for switching times**

**Table 10: Test data**

| Supply | Input | | Load | | $V_{EXT}$ |
|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | ≤ 2.0 ns | 30 pF | 1 kΩ | open |
| 2.3 V to 2.7 V | $V_{CC}$ | ≤ 2.0 ns | 30 pF | 500 Ω | open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |

## 13. Transfer characteristics

**Table 11: Transfer characteristics**

*The $V_{IH}$ and $V_{IL}$ from the family static characteristics are superseded by the $V_{T+}$ and $V_{T-}$. Voltages are referenced to GND (ground = 0 V); see Figure 8.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **$T_{amb}$ = −40 °C to +85 °C** [1] | | | | | | | |
| $V_{T+}$ | positive-going threshold | $V_{CC}$ = 1.65 V | | 0.7 | 0.98 | 1.24 | V |
| | | $V_{CC}$ = 1.95 V | | 0.75 | 1.12 | 1.46 | V |
| | | $V_{CC}$ = 2.3 V | | 0.9 | 1.27 | 1.7 | V |
| | | $V_{CC}$ = 2.7 V | | 1.0 | 1.43 | 2.0 | V |
| | | $V_{CC}$ = 3.0 V | [2] | 1.1 | 1.56 | 2.0 | V |
| | | $V_{CC}$ = 3.6 V | | 1.1 | 1.81 | 2.0 | V |
| $V_{T-}$ | negative-going threshold | $V_{CC}$ = 1.65 V | | 0.41 | 0.64 | 0.9 | V |
| | | $V_{CC}$ = 1.95 V | | 0.49 | 0.76 | 1.1 | V |
| | | $V_{CC}$ = 2.3 V | | 0.6 | 0.90 | 1.3 | V |
| | | $V_{CC}$ = 2.7 V | | 0.7 | 1.06 | 1.4 | V |
| | | $V_{CC}$ = 3.0 V | [2] | 0.8 | 1.19 | 1.5 | V |
| | | $V_{CC}$ = 3.6 V | | 0.8 | 1.42 | 1.7 | V |



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**Table 11: Transfer characteristics** *...continued*

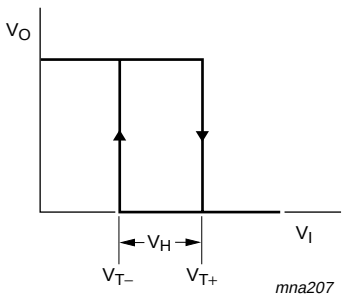
*The $V_{IH}$ and $V_{IL}$ from the family static characteristics are superseded by the $V_{T+}$ and $V_{T-}$. Voltages are referenced to GND (ground = 0 V); see Figure 8.*

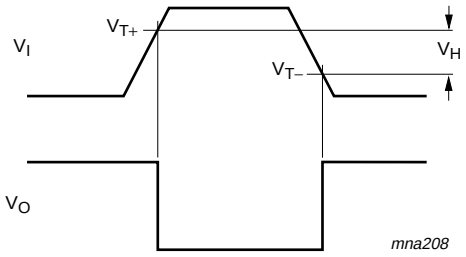
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_H$ | hysteresis ($V_{T+} - V_{T-}$) | $V_{CC}$ = 1.65 V | | 0.25 | 0.34 | 0.62 | V |
| | | $V_{CC}$ = 1.95 V | | 0.25 | 0.36 | 0.62 | V |
| | | $V_{CC}$ = 2.3 V | | 0.3 | 0.36 | 1.0 | V |
| | | $V_{CC}$ = 2.7 V | | 0.3 | 0.38 | 1.1 | V |
| | | $V_{CC}$ = 3.0 V | [2] | 0.3 | 0.37 | 1.2 | V |
| | | $V_{CC}$ = 3.6 V | | 0.3 | 0.40 | 1.2 | V |

[1] All typical values are measured at $T_{amb}$ = 25 °C.

[2] The typical transfer characteristic is displayed in Figure 9.

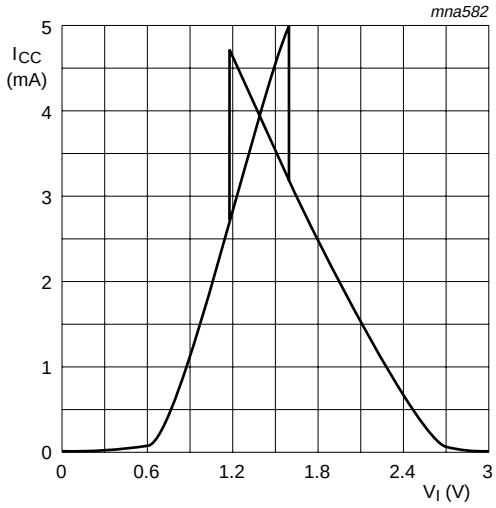
## 14. Waveforms transfer characteristics




$V_{T-}$ at 20 % and $V_{T+}$ at 70 %

**Fig 8. Definition of $V_{T+}$, $V_{T-}$ and $V_H$**



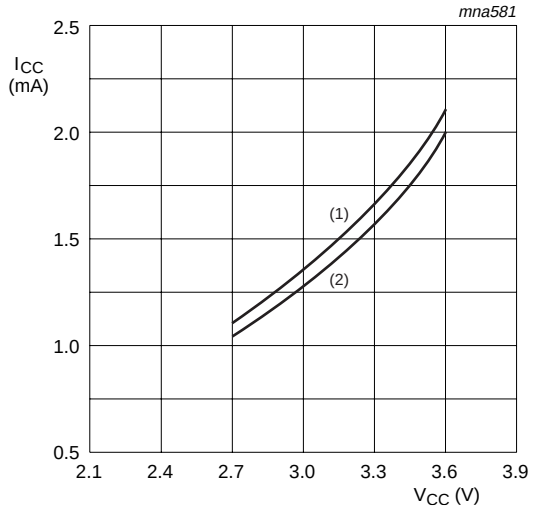

$V_{CC}$ = 3.0 V.

**Fig 9. Typical transfer characteristic**



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## 15. Application information



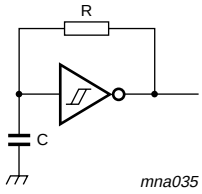

(1) Positive-going edge.

(2) Negative going-edge.

Linear change of $V_I$ between 0.8 V to 2.0 V.

All values given are typical unless otherwise specified.

**Fig 10. Average supply current as a function of supply voltage**




$$f = \frac{1}{T} \approx \frac{1}{0.8 \times RC}$$ at $V_{CC}$ = 3.0 V.

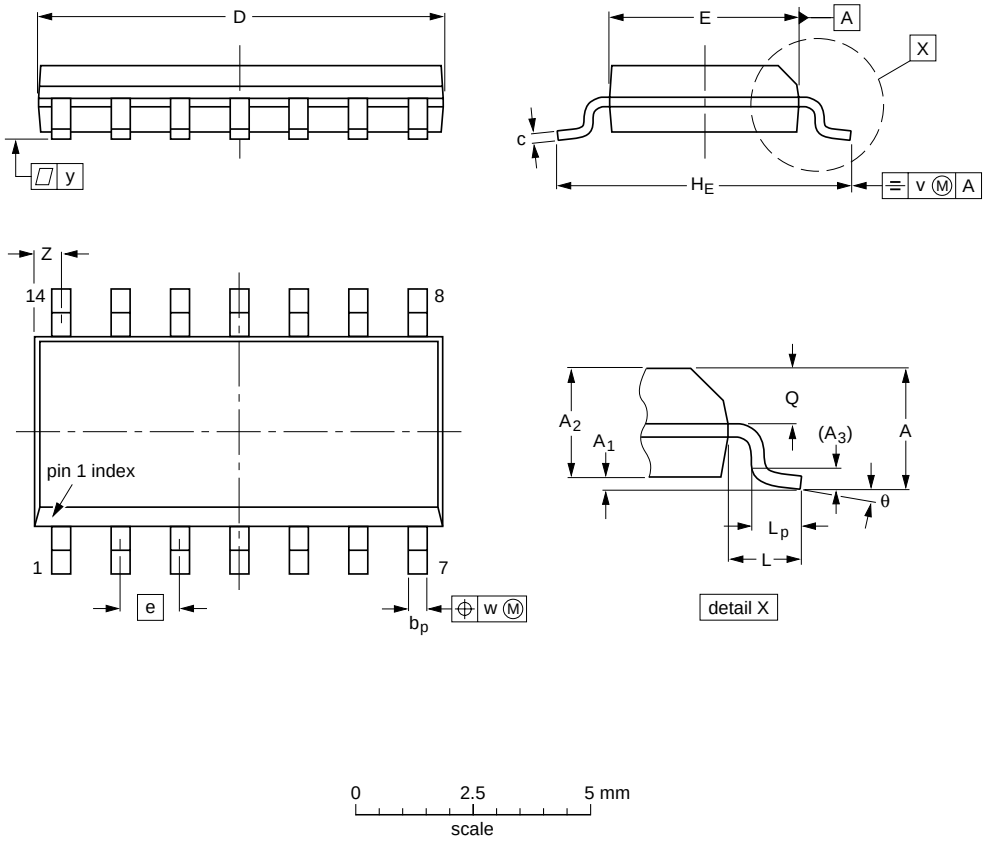
**Fig 11. Relaxation oscillator**



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# 16. Package outline

**SO14: plastic small outline package; 14 leads; body width 3.9 mm** **SOT108-1**




**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.75 | 0.25<br>0.10 | 1.45<br>1.25 | 0.25 | 0.49<br>0.36 | 0.25<br>0.19 | 8.75<br>8.55 | 4.0<br>3.8 | 1.27 | 6.2<br>5.8 | 1.05 | 1.0<br>0.4 | 0.7<br>0.6 | 0.25 | 0.25 | 0.1 | 0.7<br>0.3 | $8^o$<br>$0^o$ |
| inches | 0.069 | 0.010<br>0.004 | 0.057<br>0.049 | 0.01 | 0.019<br>0.014 | 0.0100<br>0.0075 | 0.35<br>0.34 | 0.16<br>0.15 | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 | 0.028<br>0.024 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012 | |

**Note**

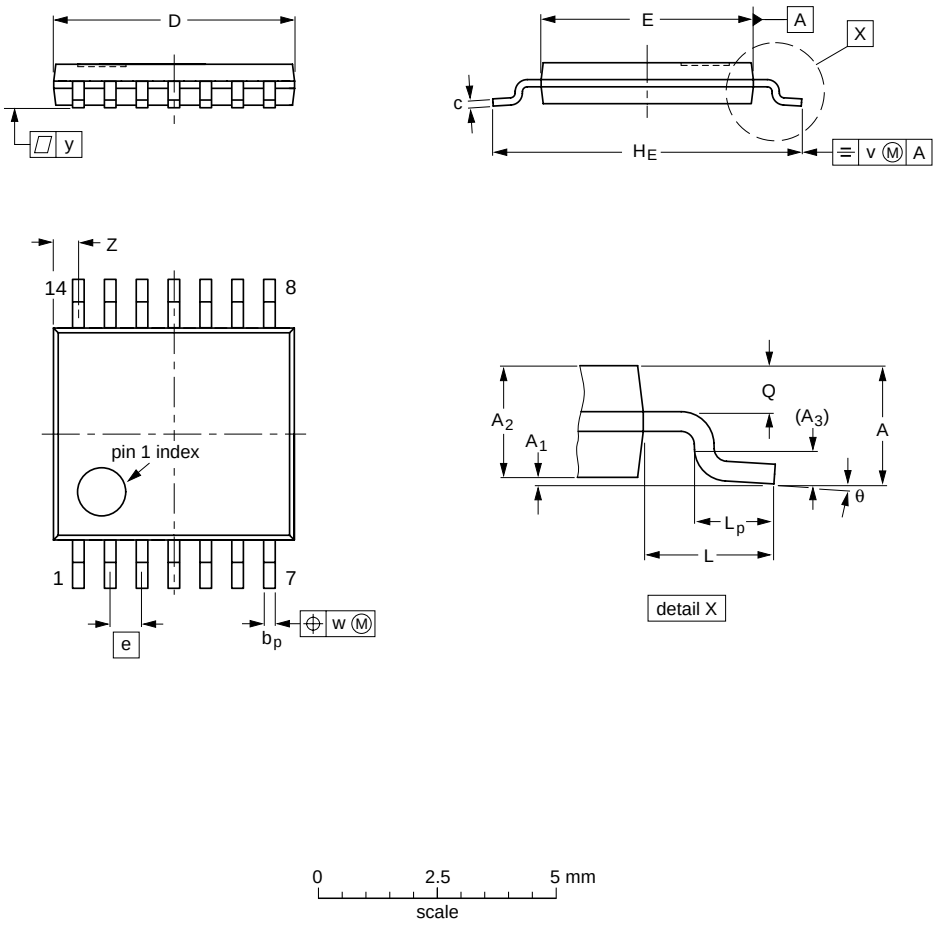
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT108-1 | 076E06 | MS-012 | | | | ~~99-12-27~~<br>03-02-19 |

**Fig 12. Package outline SOT108-1 (SO14)**


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**TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm** **SOT402-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | D (1) | E (2) | e | $H_E$ | L | $L_p$ | Q | v | w | y | Z (1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.05 | 0.95<br>0.80 | 0.25 | 0.30<br>0.19 | 0.2<br>0.1 | 5.1<br>4.9 | 4.5<br>4.3 | 0.65 | 6.6<br>6.2 | 1 | 0.75<br>0.50 | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.72<br>0.38 | $8^o$<br>$0^o$ |

**Notes**

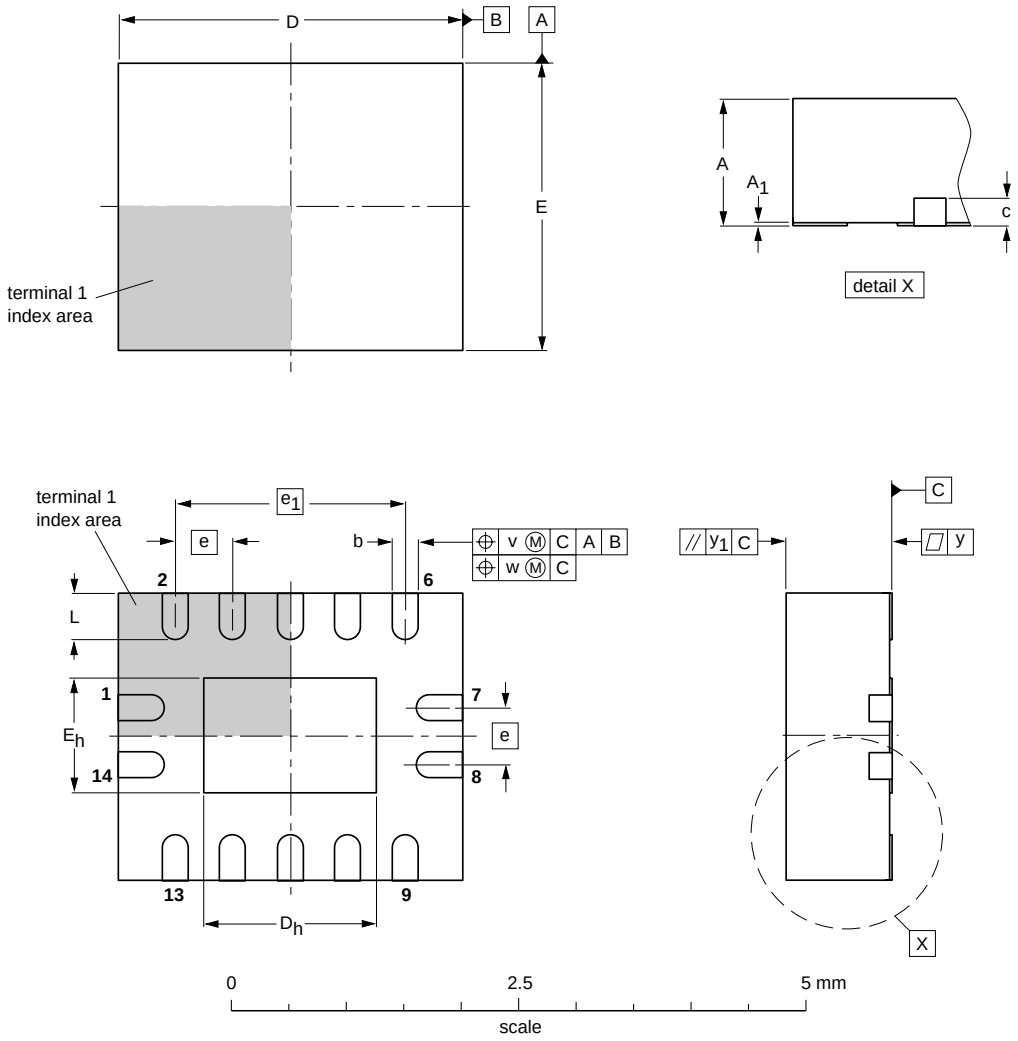
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT402-1 | | MO-153 | | | | ~~99-12-27~~<br>03-02-18 |

**Fig 13. Package outline SOT402-1 (TSSOP14)**


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**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**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | $A^{(1)}$ max. | $A_1$ | b | c | $D^{(1)}$ | $D_h$ | $E^{(1)}$ | $E_h$ | e | $e_1$ | L | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 0.05<br>0.00 | 0.30<br>0.18 | 0.2 | 3.1<br>2.9 | 1.65<br>1.35 | 2.6<br>2.4 | 1.15<br>0.85 | 0.5 | 2 | 0.5<br>0.3 | 0.1 | 0.05 | 0.05 | 0.1 |

**Note**

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT762-1 | - - - | MO-241 | - - - | | | ~~02-10-17~~<br>03-01-27 |

**Fig 14. Package outline SOT762-1 (DHVQFN14)**


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## 17. Revision history

**Table 12: Revision history**

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|---|---|---|---|---|---|
| 74ALVC14_3 | 20050215 | Product data sheet | - | 9397 750 14592 | 74ALVC14_2 |
| Modifications: | • The format of this data sheet is redesigned to comply with the current presentation and information standard of Philips Semiconductors.<br>• General text updates. | | | | |
| 74ALVC14_2 | 20030514 | Product specification | - | 9397 750 11257 | 74ALVC14_1 |
| 74ALVC14_1 | 20030203 | Product specification | - | 9397 750 10452 | - |


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## 18. Data sheet status

| Level | Data sheet status [1] | Product status [2] [3] | 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. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
| III | Product data | Production | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[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.

## 19. Definitions

**Short-form specification —** The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**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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## 21. Contact information

For additional information, please visit: **http://www.semiconductors.philips.com**

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



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