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# 74HC14; 74HCT14

## Hex inverting Schmitt trigger

Rev. 6 — 19 September 2012 | Product data sheet

## 1. General description

The 74HC14; 74HCT14 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 74HC14; 74HCT14 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 and benefits

- Low-power dissipation
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from –40 °C to +85 °C and from –40 °C to +125 °C

## 3. Applications

- Wave and pulse shapers
- Astable multivibrators
- Monostable multivibrators

## 4. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC14N | −40 °C to +125 °C | DIP14 | plastic dual in-line package; 14 leads (300 mil) | SOT27-1 |
| 74HCT14N | | | | |
| 74HC14D | −40 °C to +125 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74HCT14D | | | | |
| 74HC14DB | −40 °C to +125 °C | SSOP14 | plastic shrink small outline package; 14 leads; body width 5.3 mm | SOT337-1 |
| 74HCT14DB | | | | |
| 74HC14PW | −40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |
| 74HCT14PW | | | | |
| 74HC14BQ | −40 °C to +125 °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 |
| 74HCT14BQ | | | | |

## 5. Functional diagram

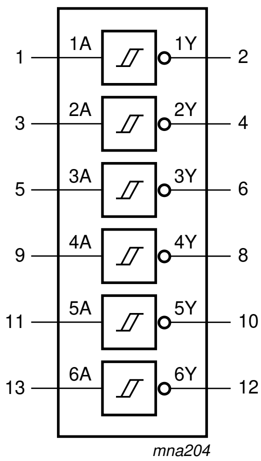



**Fig 1. Logic symbol**

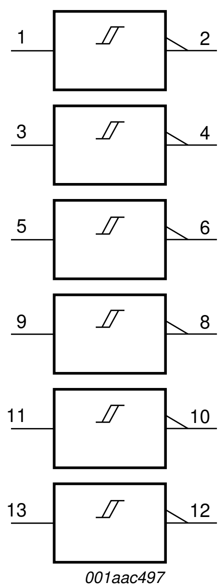



**Fig 2. IEC logic symbol**

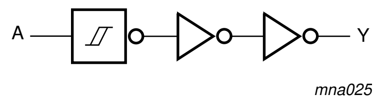



**Fig 3. Logic diagram (one Schmitt trigger)**

# 6. Pinning information

## 6.1 Pinning

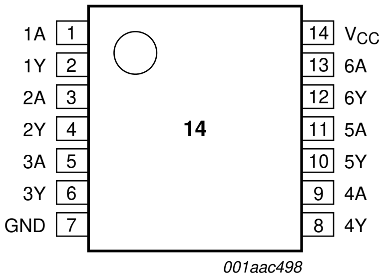
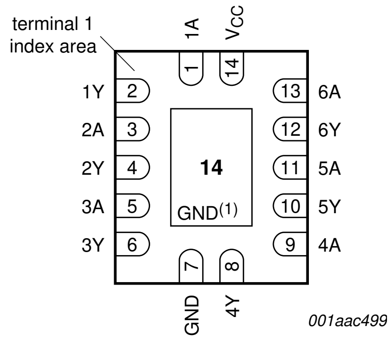



**Fig 4. Pin configuration DIP14, SO14 and (T)SSOP14**




Transparent top view

(1) The die substrate is attached to this pad using conductive die attach material. It cannot be used as a supply pin or input.

**Fig 5. Pin configuration DHVQFN14**

## 6.2 Pin description

**Table 2. Pin description**

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

# 7. Functional description

**Table 3. Function table[1]**

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

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

## 8. Limiting values

**Table 4. 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 | V |
| $I_{IK}$ | input clamping current | $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ 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 | | | - | 50 | mA |
| $I_{GND}$ | ground current | | | −50 | - | mA |
| $T_{stg}$ | storage temperature | | | −65 | +150 | °C |
| $P_{tot}$ | total power dissipation | | [2] | | | |
| | DIP14 package | | | - | 750 | mW |
| | SO14, (T)SSOP14 and DHVQFN14 packages | | | - | 500 | mW |

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

[2] For DIP14 package: $P_{tot}$ derates linearly with 12 mW/K above 70 °C.
For SO14 package: $P_{tot}$ derates linearly with 8 mW/K above 70 °C.
For (T)SSOP14 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.

## 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

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

| Symbol | Parameter | Conditions | 74HC14 | | | 74HCT14 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $V_{CC}$ | supply voltage | | 2.0 | 5.0 | 6.0 | 4.5 | 5.0 | 5.5 | V |
| $V_I$ | input voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $V_O$ | output voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | −40 | +25 | +125 | −40 | +25 | +125 | °C |

## 10. Static characteristics

**Table 6. Static characteristics**

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

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = −40 °C to +85 °C | | $T_{amb}$ = −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC14** | | | | | | | | | | |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | | | | | | | | |
| | | $I_O = -20$ µA; $V_{CC} = 2.0$ V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | $I_O = -20$ µA; $V_{CC} = 4.5$ V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O = -20$ µA; $V_{CC} = 6.0$ V | 5.9 | 6.0 | - | 5.9 | - | 5.9 | - | V |
| | | $I_O = -4.0$ mA; $V_{CC} = 4.5$ V | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| | | $I_O = -5.2$ mA; $V_{CC} = 6.0$ V | 5.48 | 5.81 | - | 5.34 | - | 5.2 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | | | | | | | | |
| | | $I_O = 20$ µA; $V_{CC} = 2.0$ V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O = 20$ µA; $V_{CC} = 4.5$ V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O = 20$ µA; $V_{CC} = 6.0$ V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O = 4.0$ mA; $V_{CC} = 4.5$ V | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| | | $I_O = 5.2$ mA; $V_{CC} = 6.0$ V | - | 0.16 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 6.0$ V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0$ V | - | - | 2.0 | - | 20 | - | 40 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | - | - | - | - | pF |
| **74HCT14** | | | | | | | | | | |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$; $V_{CC} = 4.5$ V | | | | | | | | |
| | | $I_O = -20$ µA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O = -4.0$ mA | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I = V_{T+}$ or $V_{T-}$; $V_{CC} = 4.5$ V | | | | | | | | |
| | | $I_O = 20$ µA; | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O = 4.0$ mA; | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | µA |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V | - | - | 2.0 | - | 20 | - | 40 | µA |
| $\Delta I_{CC}$ | additional supply current | per input pin; $V_I = V_{CC} - 2.1$ V; other pins at $V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 4.5$ V to 5.5 V | - | 30 | 108 | - | 135 | - | 147 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | - | - | - | - | pF |

## 11. Dynamic characteristics

**Table 7. Dynamic characteristics**

*GND = 0 V;* $C_L$ = 50 pF; *for test circuit see Figure 7.*

| Symbol | Parameter | Conditions | | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | Max (85 °C) | Max (125 °C) | |
| **74HC14** | | | | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 | [1] | | | | | | |
| | | $V_{CC}$ = 2.0 V | | - | 41 | 125 | 155 | 190 | ns |
| | | $V_{CC}$ = 4.5 V | | - | 15 | 25 | 31 | 38 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | | - | 12 | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V | | - | 12 | 21 | 26 | 32 | ns |
| $t_t$ | transition time | see Figure 6 | [2] | | | | | | |
| | | $V_{CC}$ = 2.0 V | | - | 19 | 75 | 95 | 110 | ns |
| | | $V_{CC}$ = 4.5 V | | - | 7 | 15 | 19 | 22 | ns |
| | | $V_{CC}$ = 6.0 V | | - | 6 | 13 | 15 | 19 | ns |
| $C_{PD}$ | power dissipation capacitance | per package; $V_I$ = GND to $V_{CC}$ | [3] | - | 7 | - | - | - | pF |
| **74HCT14** | | | | | | | | | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 6 | [1] | | | | | | |
| | | $V_{CC}$ = 4.5 V | | - | 20 | 34 | 43 | 51 | ns |
| | | $V_{CC}$ = 5.0 V; $C_L$ = 15 pF | | - | 17 | - | - | - | ns |
| $t_t$ | transition time | $V_{CC}$ = 4.5 V; see Figure 6 | [2] | - | 7 | 15 | 19 | 22 | ns |
| $C_{PD}$ | power dissipation capacitance | per package; $V_I$ = GND to $V_{CC}$ – 1.5 V | [3] | - | 8 | - | - | - | pF |

[1] $t_{pd}$ is the same as $t_{PHL}$ and $t_{PLH}$.

[2] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[3] $C_{PD}$ 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;

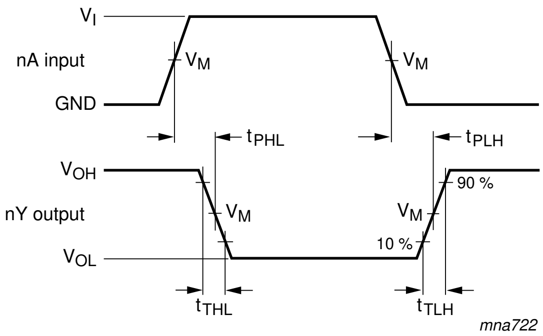
$C_L$ = output load capacitance in pF;

$V_{CC}$ = supply voltage in V;

N = number of inputs switching;

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

## 12. Waveforms



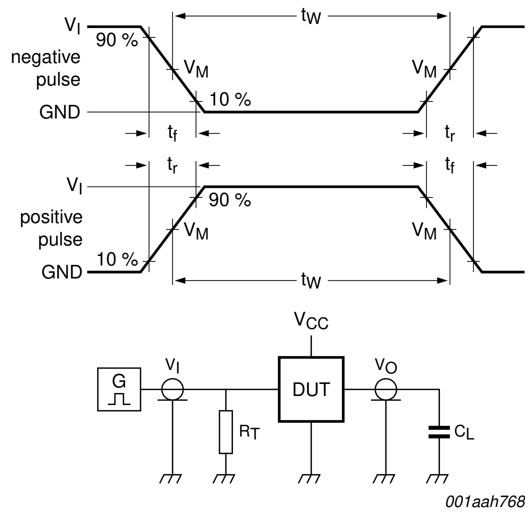

Measurement points are given in Table 8.

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

**Fig 6. Input to output propagation delays**

**Table 8. Measurement points**

| Type | Input | Output | | |
|---|---|---|---|---|
| | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 74HC14 | $0.5V_{CC}$ | $0.5V_{CC}$ | $0.1V_{CC}$ | $0.9V_{CC}$ |
| 74HCT14 | 1.3 V | 1.3 V | $0.1V_{CC}$ | $0.9V_{CC}$ |




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.

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

**Table 9. Test data**

| Type | Input | | Load | Test |
|---|---|---|---|---|
| | $V_I$ | $t_r$, $t_f$ | $C_L$ | |
| 74HC14 | $V_{CC}$ | 6.0 ns | 15 pF, 50 pF | $t_{PLH}$, $t_{PHL}$ |
| 74HCT14 | 3.0 V | 6.0 ns | 15 pF, 50 pF | $t_{PLH}$, $t_{PHL}$ |

## 13. Transfer characteristics

**Table 10. Transfer characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); see Figure 8 and Figure 9.*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +85 °C | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC14** | | | | | | | | | | |
| $V_{T+}$ | positive-going threshold voltage | $V_{CC}$ = 2.0 V | 0.7 | 1.18 | 1.5 | 0.7 | 1.5 | 0.7 | 1.5 | V |
| | | $V_{CC}$ = 4.5 V | 1.7 | 2.38 | 3.15 | 1.7 | 3.15 | 1.7 | 3.15 | V |
| | | $V_{CC}$ = 6.0 V | 2.1 | 3.14 | 4.2 | 2.1 | 4.2 | 2.1 | 4.2 | V |
| $V_{T-}$ | negative-going threshold voltage | $V_{CC}$ = 2.0 V | 0.3 | 0.52 | 0.9 | 0.3 | 0.9 | 0.3 | 0.9 | V |
| | | $V_{CC}$ = 4.5 V | 0.9 | 1.4 | 2.0 | 0.9 | 2.0 | 0.9 | 2.0 | V |
| | | $V_{CC}$ = 6.0 V | 1.2 | 1.89 | 2.6 | 1.2 | 2.6 | 1.2 | 2.6 | V |
| $V_H$ | hysteresis voltage | $V_{CC}$ = 2.0 V | 0.2 | 0.66 | 1.0 | 0.2 | 1.0 | 0.2 | 1.0 | V |
| | | $V_{CC}$ = 4.5 V | 0.4 | 0.98 | 1.4 | 0.4 | 1.4 | 0.4 | 1.4 | V |
| | | $V_{CC}$ = 6.0 V | 0.6 | 1.25 | 1.6 | 0.6 | 1.6 | 0.6 | 1.6 | V |
| **74HCT14** | | | | | | | | | | |
| $V_{T+}$ | positive-going threshold voltage | $V_{CC}$ = 4.5 V | 1.2 | 1.41 | 1.9 | 1.2 | 1.9 | 1.2 | 1.9 | V |
| | | $V_{CC}$ = 5.5 V | 1.4 | 1.59 | 2.1 | 1.4 | 2.1 | 1.4 | 2.1 | V |
| $V_{T-}$ | negative-going threshold voltage | $V_{CC}$ = 4.5 V | 0.5 | 0.85 | 1.2 | 0.5 | 1.2 | 0.5 | 1.2 | V |
| | | $V_{CC}$ = 5.5 V | 0.6 | 0.99 | 1.4 | 0.6 | 1.4 | 0.6 | 1.4 | V |
| $V_H$ | hysteresis voltage | $V_{CC}$ = 4.5 V | 0.4 | 0.56 | - | 0.4 | - | 0.4 | - | V |
| | | $V_{CC}$ = 5.5 V | 0.4 | 0.6 | - | 0.4 | - | 0.4 | - | V |

## 14. Transfer characteristics waveforms

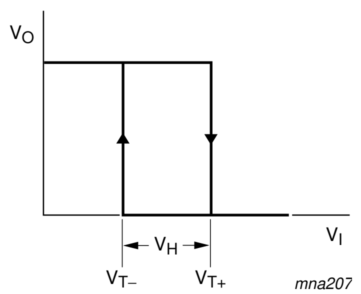



**Fig 8. Transfer characteristics**

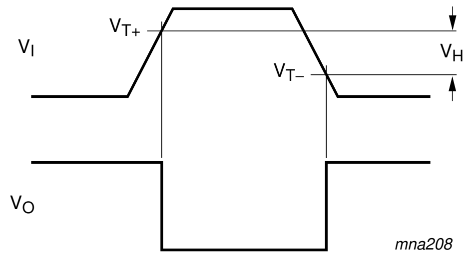
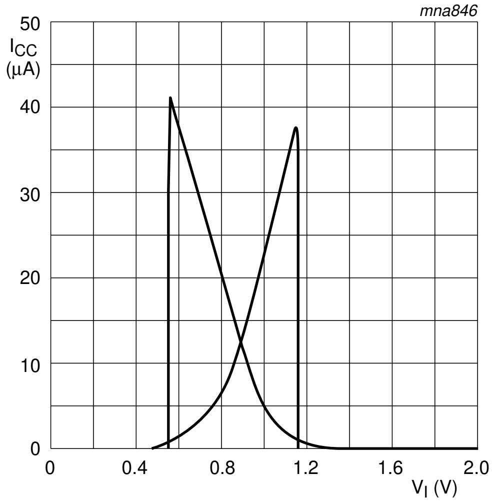
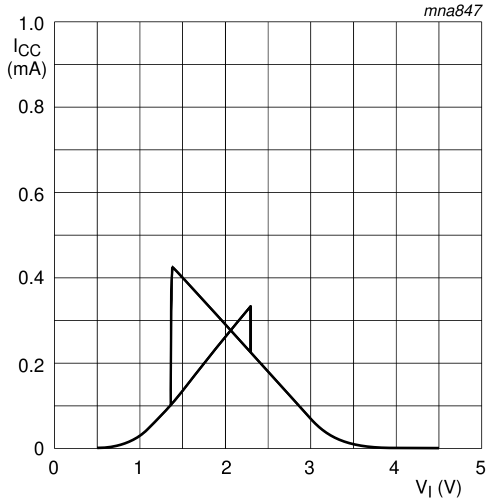


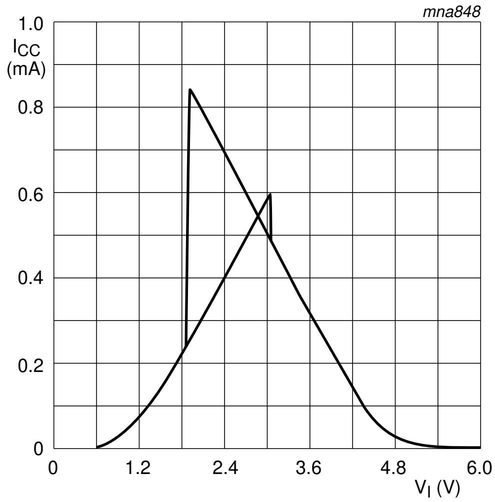

**Fig 9. Transfer characteristics definitions**




a. $V_{CC}$ = 2.0 V

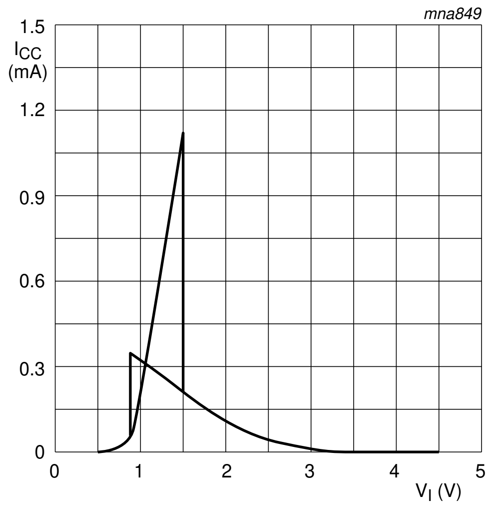



b. $V_{CC}$ = 4.5 V

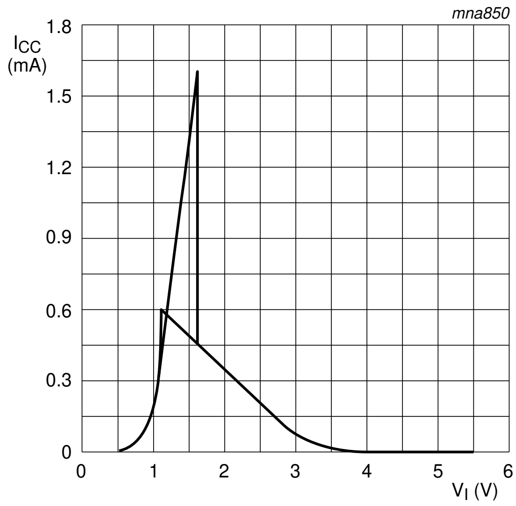



c. $V_{CC}$ = 6.0 V

**Fig 10. Typical 74HC transfer characteristics**




a. $V_{CC}$ = 4.5 V




b. $V_{CC}$ = 5.5 V

**Fig 11. Typical 74HCT transfer characteristics**

## 15. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$P_{add} = f_i \times (t_r \times \Delta I_{CC(AV)} + t_f \times \Delta I_{CC(AV)}) \times V_{CC}$ where:

$P_{add}$ = additional power dissipation (μW);

$f_i$ = input frequency (MHz);

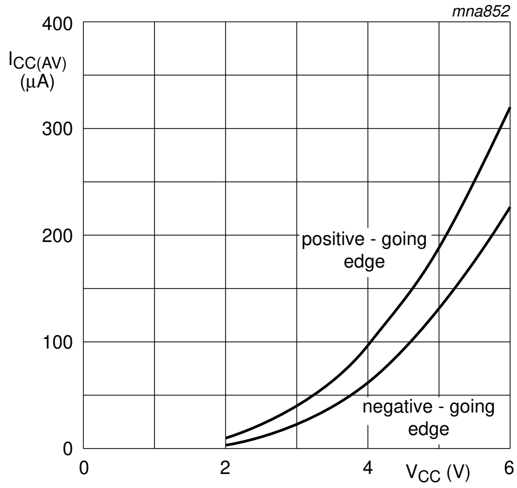
$t_r$ = rise time (ns); 10 % to 90 %;

$t_f$ = fall time (ns); 90 % to 10 %;

$\Delta I_{CC(AV)}$ = average additional supply current (μA).

Average $\Delta I_{CC(AV)}$ differs with positive or negative input transitions, as shown in Figure 12 and Figure 13.

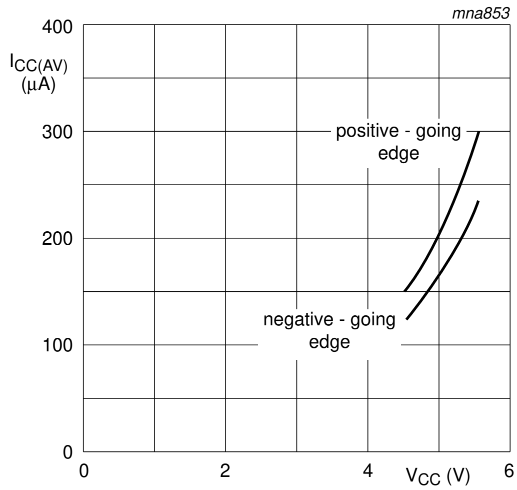
An example of a relaxation circuit using the 74HC14; 74HCT14 is shown in Figure 14.




(1) Positive-going edge.

(2) Negative-going edge.

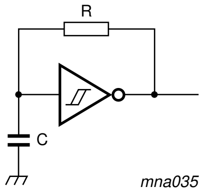
**Fig 12. Average additional supply current as a function of $V_{CC}$ for 74HC14; linear change of $V_I$ between $0.1V_{CC}$ to $0.9V_{CC}$.**




(1) Positive-going edge.

(2) Negative-going edge.

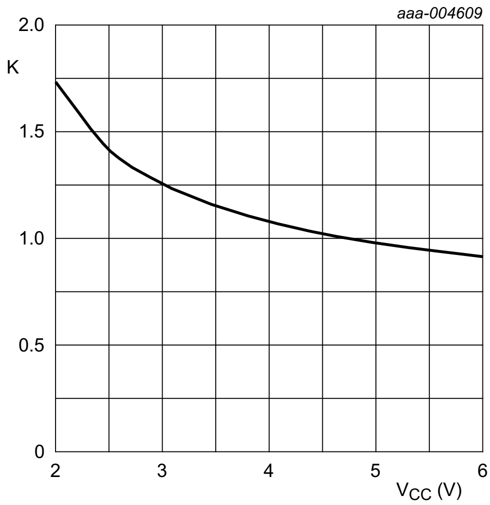
**Fig 13. Average additional supply current as a function of $V_{CC}$ for 74HCT14; linear change of $V_I$ between $0.1V_{CC}$ to $0.9V_{CC}$.**



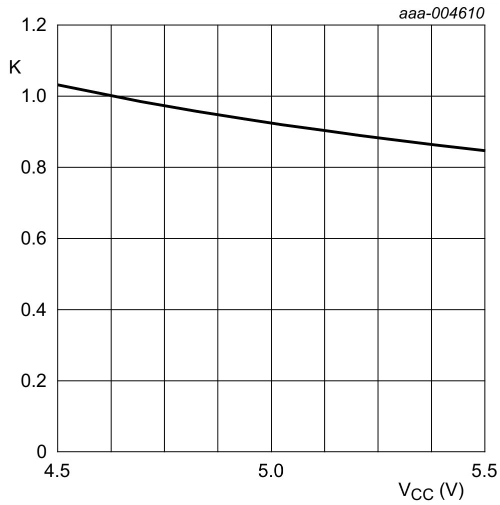

For 74HC14 and 74HCT14: $f = \frac{1}{T} \approx \frac{1}{K \times RC}$

For K-factor see Figure 15

**Fig 14. Relaxation oscillator**




K-factor for 74HC14

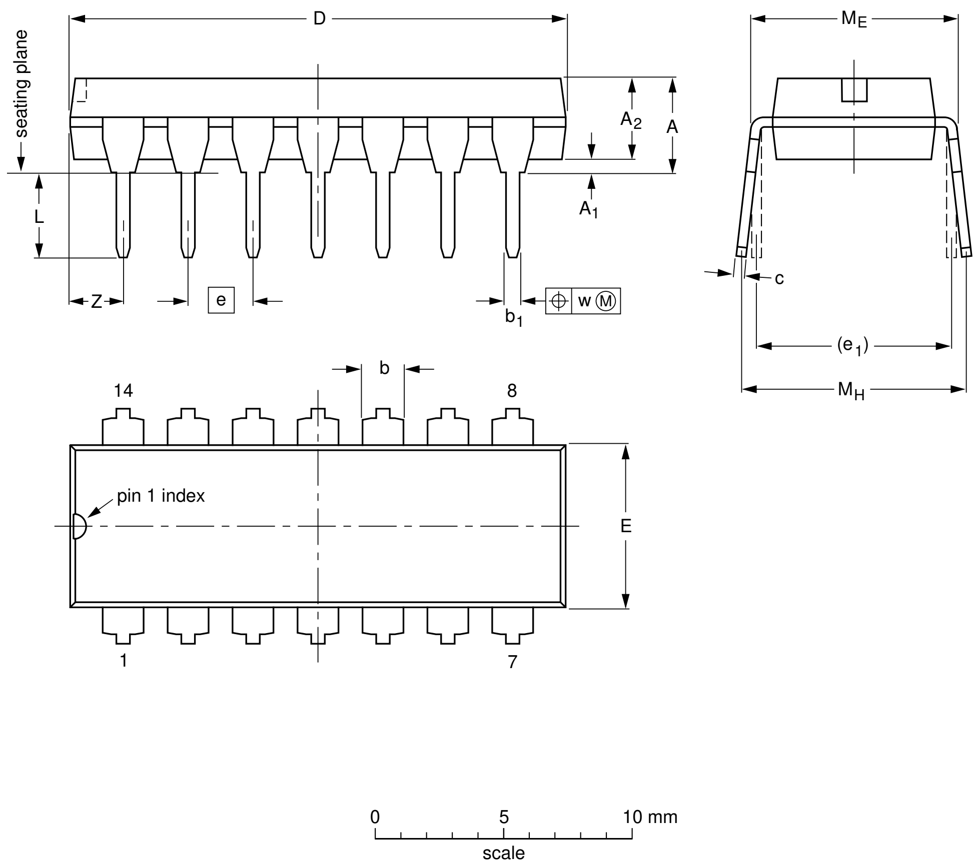



K-factor for 74HCT14

**Fig 15. Typical K-factor for relaxation oscillator**

## 16. Package outline

**DIP14: plastic dual in-line package; 14 leads (300 mil)** **SOT27-1**




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

| UNIT | A max. | $A_1$ min. | $A_2$ max. | b | $b_1$ | c | D (1) | E (1) | e | $e_1$ | L | $M_E$ | $M_H$ | w | Z (1) max. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.2 | 0.51 | 3.2 | 1.73<br>1.13 | 0.53<br>0.38 | 0.36<br>0.23 | 19.50<br>18.55 | 6.48<br>6.20 | 2.54 | 7.62 | 3.60<br>3.05 | 8.25<br>7.80 | 10.0<br>8.3 | 0.254 | 2.2 |
| inches | 0.17 | 0.02 | 0.13 | 0.068<br>0.044 | 0.021<br>0.015 | 0.014<br>0.009 | 0.77<br>0.73 | 0.26<br>0.24 | 0.1 | 0.3 | 0.14<br>0.12 | 0.32<br>0.31 | 0.39<br>0.33 | 0.01 | 0.087 |

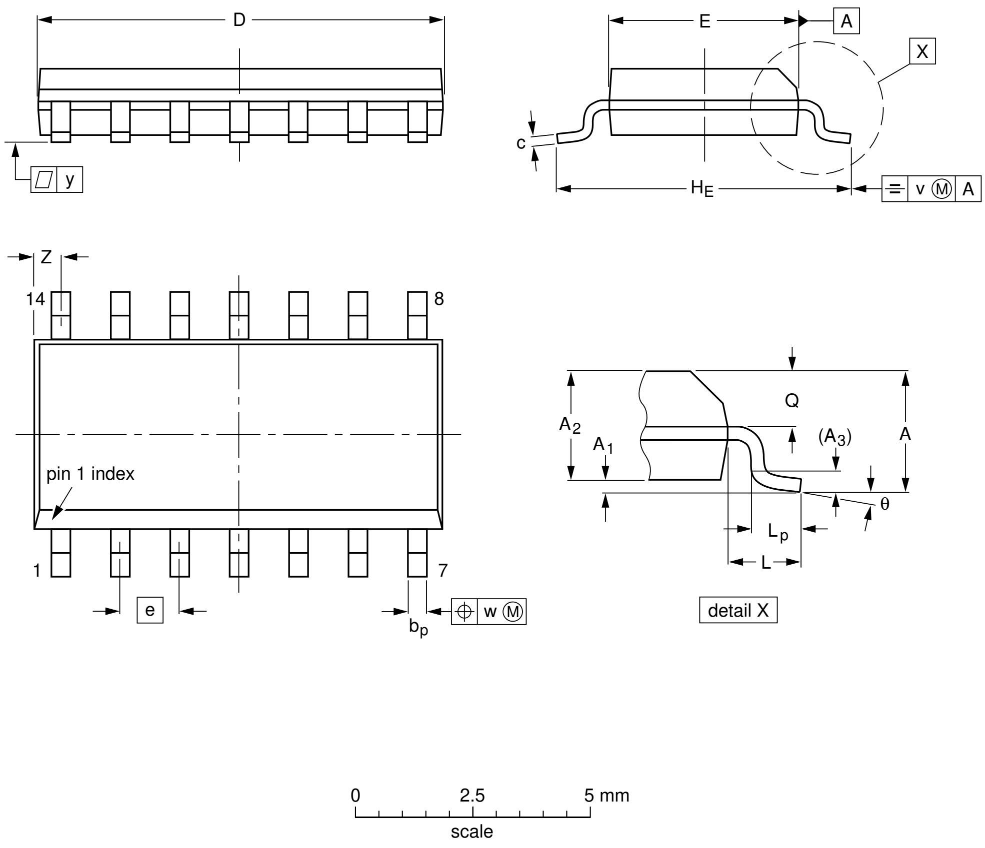
**Note**

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT27-1 | 050G04 | MO-001 | SC-501-14 | | | ~~99-12-27~~<br>03-02-13 |

**Fig 16. Package outline SOT27-1 (DIP14)**

**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°<br>0° |
| 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 | |

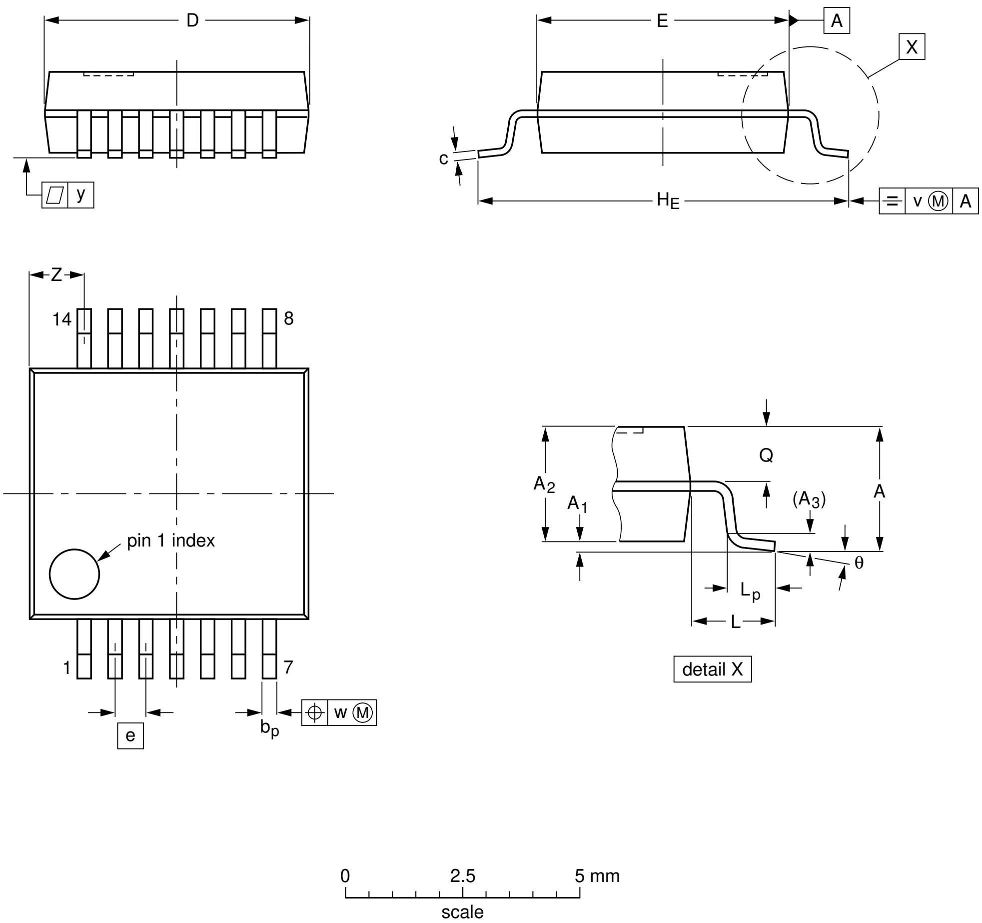
**Note**

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 17. Package outline SOT108-1 (SO14)**

**SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm** **SOT337-1**




**DIMENSIONS (mm are the original 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 | 2 | 0.21<br>0.05 | 1.80<br>1.65 | 0.25 | 0.38<br>0.25 | 0.20<br>0.09 | 6.4<br>6.0 | 5.4<br>5.2 | 0.65 | 7.9<br>7.6 | 1.25 | 1.03<br>0.63 | 0.9<br>0.7 | 0.2 | 0.13 | 0.1 | 1.4<br>0.9 | 8°<br>0° |

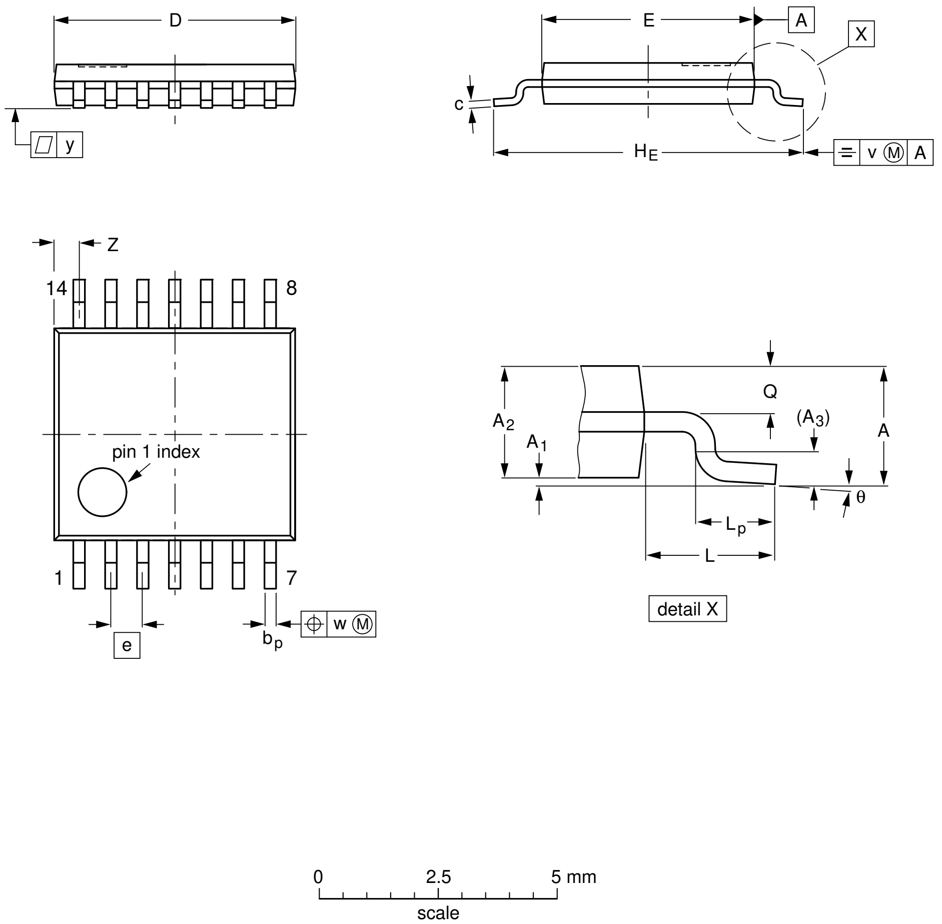
**Note**

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

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT337-1 | | MO-150 | | | | ~~99-12-27~~<br>03-02-19 |

**Fig 18. Package outline SOT337-1 (SSOP14)**

**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°<br>0° |

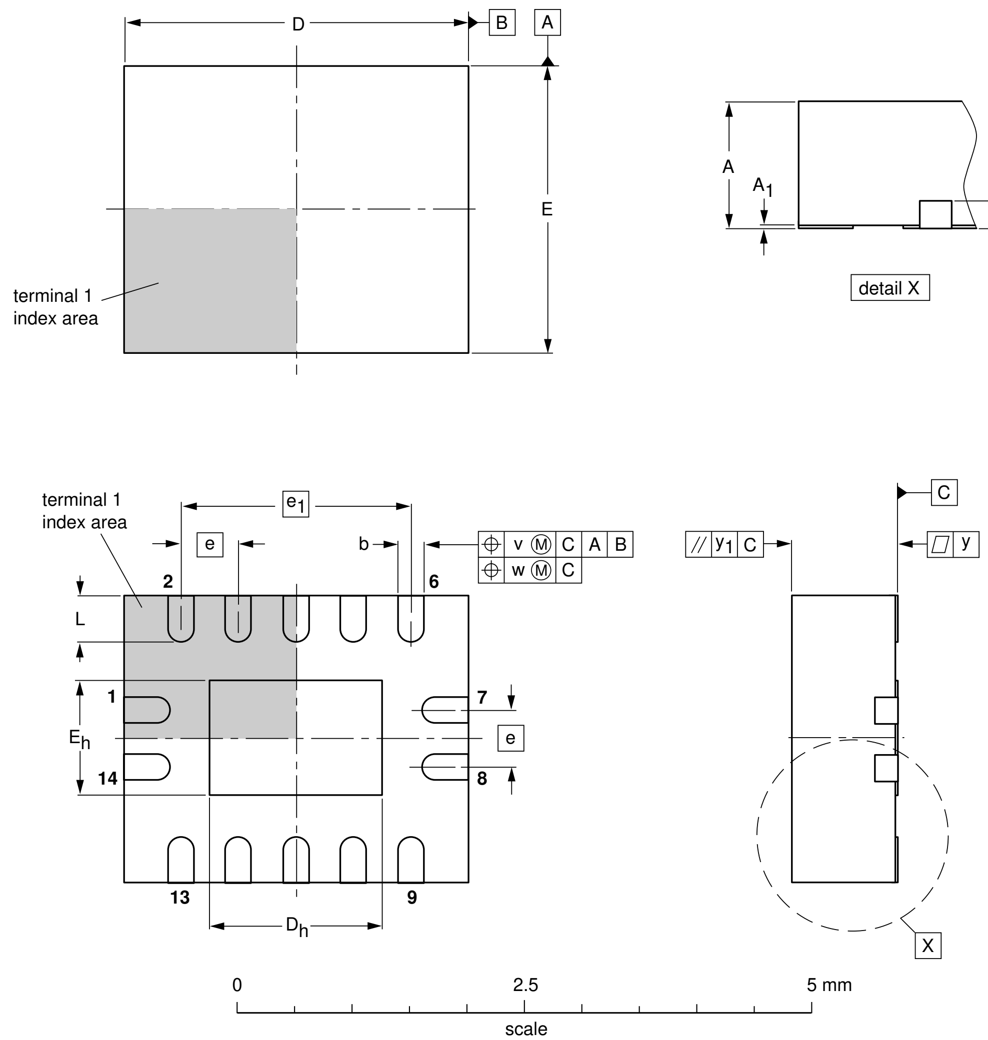
**Notes**

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 19. Package outline SOT402-1 (TSSOP14)**

**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 20. Package outline SOT762-1 (DHVQFN14)**

## 17. Abbreviations

**Table 11. Abbreviations**

| Acronym | Description |
|---|---|
| CMOS | Complementary Metal-Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| LSTTL | Low-power Schottky Transistor-Transistor Logic |
| MM | Machine Model |

## 18. Revision history

**Table 12. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT14 v.6 | 20120919 | Product data sheet | - | 74HC_HCT14 v.5 |
| Modifications: | • Figure 15 added (typical K-factor for relaxation oscillator). | | | |
| 74HC_HCT14 v.5 | 20111219 | Product data sheet | - | 74HC_HCT14 v.4 |
| Modifications: | • Legal pages updated. | | | |
| 74HC_HCT14 v.4 | 20110117 | Product data sheet | - | 74HC_HCT14 v.3 |
| 74HC_HCT14 v.3 | 20031030 | Product specification | - | 74HC_HCT14_CNV v.2 |
| 74HC_HCT14_CNV v.2 | 19970826 | Product specification | - | - |

# 19. Legal information

## 19.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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