

# DATA SHEET

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## **74AHC3G14; 74AHCT3G14** Inverting Schmitt trigger

Product specification  
Supersedes data of 2003 Nov 27

2004 Oct 18

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## FEATURES

- Symmetrical output impedance
- High noise immunity
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V
  - CDM EIA/JESD22-C101 exceeds 500 V.
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ .

## APPLICATIONS

- Wave and pulse shapers
- Astable multivibrators
- Monostable multivibrators.

## DESCRIPTION

The 74AHC3G/AHCT3G14 is a high-speed Si-gate CMOS device.

The 74AHC3G/AHCT3G14 provides three inverting buffers with Schmitt-trigger action. These devices are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

## QUICK REFERENCE DATA

GND = 0 V;  $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f \leq 3.0\text{ ns}$ .

| SYMBOL                          | PARAMETER                     | CONDITIONS  | TYPICAL |          | UNIT |
|---------------------------------|-------------------------------|---|---------|----------|------|
|                                 |                               |   | AHC3G14 | AHCT3G14 |      |
| $t_{\text{PHL}}/t_{\text{PLH}}$ | propagation delay A to Y      | $C_L = 15\text{ pF}$ ; $V_{\text{CC}} = 5\text{ V}$       | 3.2     | 4.1      | ns   |
| $C_I$                           | input capacitance             |   | 1.5     | 1.5      | pF   |
| $C_{\text{PD}}$                 | power dissipation capacitance | $C_L = 15\text{ pF}$ ; $f = 1\text{ MHz}$ ; notes 1 and 2 | 10      | 12       | pF   |

## Notes

1.  $C_{\text{PD}}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

$V_{\text{CC}}$  = supply voltage in Volts;

$N$  = number of inputs switching;

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

2. The condition is  $V_I = \text{GND to } V_{\text{CC}}$ .

## FUNCTION TABLE

See note 1.

| INPUT | OUTPUT |
|-------|--------|
| nA    | nY     |
| L     | H      |
| H     | L      |

## Note

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

# Inverting Schmitt trigger

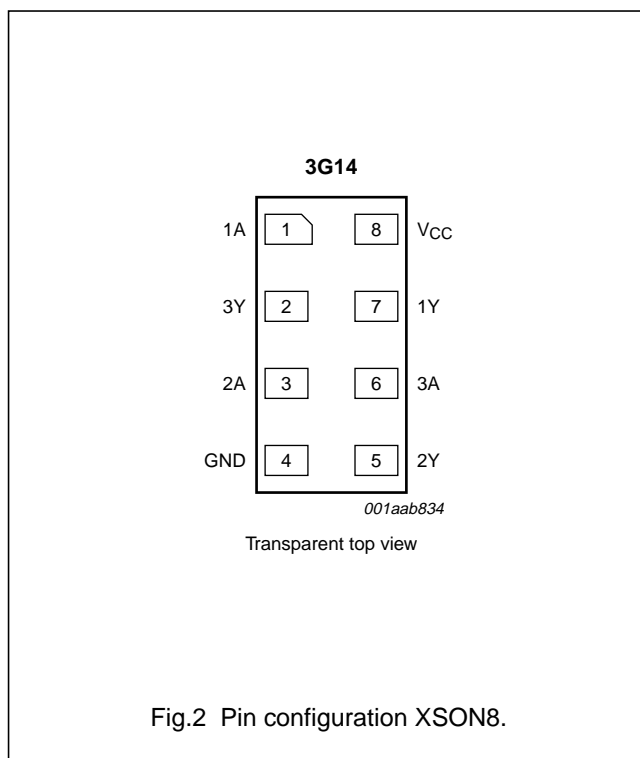
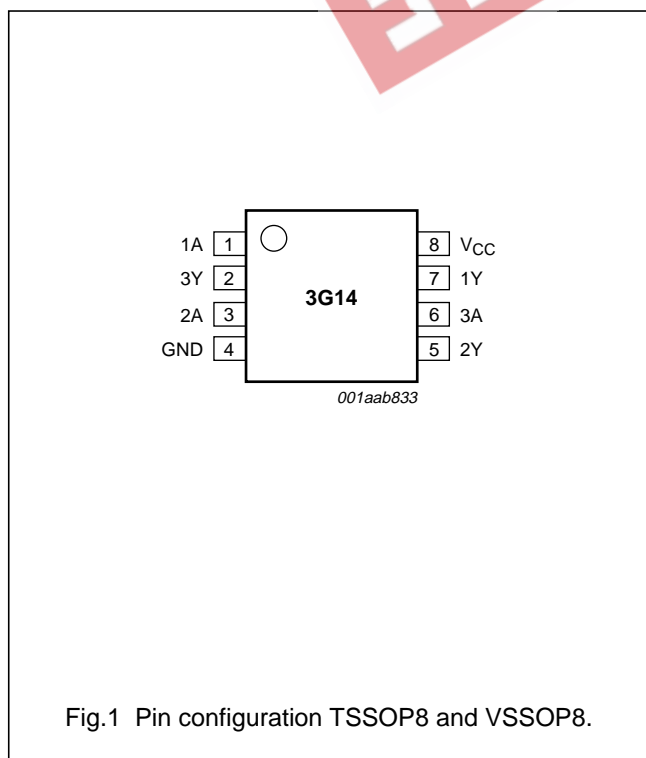
# 74AHC3G14; 74AHCT3G14

## ORDERING INFORMATION

| TYPE NUMBER  | PACKAGE           |      |         |          |          |         |
|--------------|-------------------|------|---------|----------|----------|---------|
|              | TEMPERATURE RANGE | PINS | PACKAGE | MATERIAL | CODE     | MARKING |
| 74AHC3G14DP  | -40 °C to +125 °C | 8    | TSSOP8  | plastic  | SOT505-2 | A14     |
| 74AHCT3G14DP | -40 °C to +125 °C | 8    | TSSOP8  | plastic  | SOT505-2 | C14     |
| 74AHC3G14DC  | -40 °C to +125 °C | 8    | VSSOP8  | plastic  | SOT765-1 | A14     |
| 74AHCT3G14DC | -40 °C to +125 °C | 8    | VSSOP8  | plastic  | SOT765-1 | C14     |
| 74AHC3G14GM  | -40 °C to +125 °C | 8    | XSON8   | plastic  | SOT833-1 | A14     |
| 74AHCT3G14GM | -40 °C to +125 °C | 8    | XSON8   | plastic  | SOT833-1 | C14     |

## PINNING

| PIN | SYMBOL          | DESCRIPTION    |
|-----|-----------------|----------------|
| 1   | 1A              | data input     |
| 2   | 3Y              | data output    |
| 3   | 2A              | data input     |
| 4   | GND             | ground (0 V)   |
| 5   | 2Y              | data output    |
| 6   | 3A              | data input     |
| 7   | 1Y              | data output    |
| 8   | V <sub>CC</sub> | supply voltage |



# Inverting Schmitt trigger

# 74AHC3G14; 74AHCT3G14

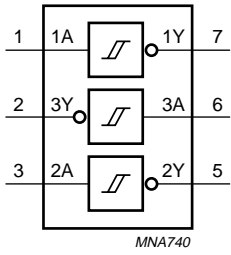


Fig.3 Logic symbol.

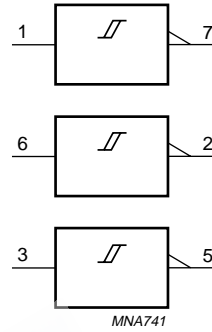


Fig.4 IEC logic symbol.

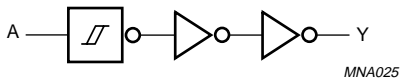


Fig.5 Logic diagram (one driver).

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## RECOMMENDED OPERATING CONDITIONS

| SYMBOL    | PARAMETER                     | CONDITIONS                               | 74AHC3G |      |          | 74AHCT3G |      |          | 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    |
| $T_{amb}$ | operating ambient temperature | see DC and AC characteristics per device | –40     | +25  | +125     | –40      | +25  | +125     | °C   |

## 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; note 1 | –    | ±20  | mA   |
| $I_O$             | output source or sink current | $-0.5$ V < $V_O$ < $V_{CC} + 0.5$ V              | –    | ±25  | mA   |
| $I_{CC}, I_{GND}$ | $V_{CC}$ or GND current       |  | –    | ±75  | mA   |
| $T_{stg}$         | storage temperature           |  | –65  | +150 | °C   |
| $P_D$             | power dissipation             | $T_{amb} = -40$ °C to +125 °C                    | –    | 250  | mW   |

## Note

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

## Inverting Schmitt trigger

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## DC CHARACTERISTICS

## Type 74AHC3G14

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

| SYMBOL                                    | PARAMETER                 | TEST CONDITIONS   |                     | MIN. | TYP. | MAX. | UNIT |
|---|---------------------------|---|---------------------|------|------|------|------|
|   |                           | OTHER   | V <sub>CC</sub> (V) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>            |                           |   |                     |      |      |      |      |
| V <sub>OH</sub>                           | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>           |                     |      |      |      |      |
|   |                           | I <sub>O</sub> = -50 μA                                       | 2.0                 | 1.9  | 2.0  | -    | V    |
|   |                           | I <sub>O</sub> = -50 μA                                       | 3.0                 | 2.9  | 3.0  | -    | V    |
|   |                           | I <sub>O</sub> = -50 μA                                       | 4.5                 | 4.4  | 4.5  | -    | V    |
|   |                           | I <sub>O</sub> = -4.0 mA                                      | 3.0                 | 2.58 | -    | -    | V    |
|   |                           | I <sub>O</sub> = -8.0 mA                                      | 4.5                 | 3.94 | -    | -    | V    |
| V <sub>OL</sub>                           | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>           |                     |      |      |      |      |
|   |                           | I <sub>O</sub> = 50 μA  | 2.0                 | -    | 0    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 50 μA  | 3.0                 | -    | 0    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 50 μA  | 4.5                 | -    | 0    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 4.0 mA                                       | 3.0                 | -    | -    | 0.36 | V    |
|   |                           | I <sub>O</sub> = 8.0 mA                                       | 4.5                 | -    | -    | 0.36 | V    |
| I <sub>LI</sub>                           | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND                       | 5.5                 | -    | -    | 0.1  | μA   |
| I <sub>CC</sub>                           | quiescent supply current  | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A | 5.5                 | -    | -    | 1.0  | μA   |
| C <sub>I</sub>                            | input capacitance         |   | -                   | -    | 1.5  | 10   | pF   |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |                           |   |                     |      |      |      |      |
| V <sub>OH</sub>                           | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>           |                     |      |      |      |      |
|   |                           | I <sub>O</sub> = -50 μA                                       | 2.0                 | 1.9  | -    | -    | V    |
|   |                           | I <sub>O</sub> = -50 μA                                       | 3.0                 | 2.9  | -    | -    | V    |
|   |                           | I <sub>O</sub> = -50 μA                                       | 4.5                 | 4.4  | -    | -    | V    |
|   |                           | I <sub>O</sub> = -4.0 mA                                      | 3.0                 | 2.48 | -    | -    | V    |
|   |                           | I <sub>O</sub> = -8.0 mA                                      | 4.5                 | 3.8  | -    | -    | V    |
| V <sub>OL</sub>                           | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>           |                     |      |      |      |      |
|   |                           | I <sub>O</sub> = 50 μA  | 2.0                 | -    | -    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 50 μA  | 3.0                 | -    | -    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 50 μA  | 4.5                 | -    | -    | 0.1  | V    |
|   |                           | I <sub>O</sub> = 4.0 mA                                       | 3.0                 | -    | -    | 0.44 | V    |
|   |                           | I <sub>O</sub> = 8.0 mA                                       | 4.5                 | -    | -    | 0.44 | V    |
| I <sub>LI</sub>                           | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND                       | 5.5                 | -    | -    | 1.0  | μA   |
| I <sub>CC</sub>                           | quiescent supply current  | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A | 5.5                 | -    | -    | 10   | μA   |
| C <sub>I</sub>                            | input capacitance         |   | -                   | -    | -    | 10   | pF   |

## Inverting Schmitt trigger

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| SYMBOL                                     | PARAMETER                 | TEST CONDITIONS  |                     | MIN. | TYP. | MAX. | UNIT |
|--|---------------------------|--|---------------------|------|------|------|------|
|  |                           | OTHER  | V <sub>CC</sub> (V) |      |      |      |      |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                           |  |                     |      |      |      |      |
| V <sub>OH</sub>                            | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>O</sub> = -50 μA | 2.0                 | 1.9  | -    | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA  | 3.0                 | 2.9  | -    | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA  | 4.5                 | 4.4  | -    | -    | V    |
|  |                           | I <sub>O</sub> = -4.0 mA   | 3.0                 | 2.40 | -    | -    | V    |
|  |                           | I <sub>O</sub> = -8.0 mA   | 4.5                 | 3.70 | -    | -    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>O</sub> = 50 μA  | 2.0                 | -    | -    | 0.1  | V    |
|  |                           | I <sub>O</sub> = 50 μA   | 3.0                 | -    | -    | 0.1  | V    |
|  |                           | I <sub>O</sub> = 50 μA   | 4.5                 | -    | -    | 0.1  | V    |
|  |                           | I <sub>O</sub> = 4.0 mA  | 3.0                 | -    | -    | 0.55 | V    |
|  |                           | I <sub>O</sub> = 8.0 mA  | 4.5                 | -    | -    | 0.55 | V    |
| I <sub>LI</sub>                            | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND  | 5.5                 | -    | -    | 2.0  | μA   |
| I <sub>CC</sub>                            | quiescent supply current  | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                  | 5.5                 | -    | -    | 40   | μA   |
| C <sub>I</sub>                             | input capacitance         |  | -                   | -    | -    | 10   | pF   |

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## Type 74AHCT3G14

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

| SYMBOL                                     | PARAMETER   | TEST CONDITIONS  |                     | MIN. | TYP. | MAX. | UNIT |
|--|---|--|---------------------|------|------|------|------|
|  |   | OTHER  | V <sub>CC</sub> (V) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>             |   |  |                     |      |      |      |      |
| V <sub>OH</sub>                            | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | 4.4  | 4.5  | –    | V    |
|  |   | I <sub>O</sub> = –50 μA<br>I <sub>O</sub> = –8.0 mA                                  | 4.5                 | 3.94 | –    | –    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | –    | 0    | 0.1  | V    |
|  |   | I <sub>O</sub> = 50 μA<br>I <sub>O</sub> = 8.0 mA                                    | 4.5                 | –    | –    | 0.36 | V    |
| I <sub>LI</sub>                            | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 5.5                 | –    | –    | 0.1  | μA   |
| I <sub>CC</sub>                            | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                        | 5.5                 | –    | –    | 1.0  | μA   |
| ΔI <sub>CC</sub>                           | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A | 5.5                 | –    | –    | 1.35 | mA   |
| C <sub>I</sub>                             | input capacitance                                 |  | –                   | –    | 1.5  | 10   | pF   |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |   |  |                     |      |      |      |      |
| V <sub>OH</sub>                            | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | 4.4  | –    | –    | V    |
|  |   | I <sub>O</sub> = –50 μA<br>I <sub>O</sub> = –8.0 mA                                  | 4.5                 | 3.8  | –    | –    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | –    | –    | 0.1  | V    |
|  |   | I <sub>O</sub> = 50 μA<br>I <sub>O</sub> = 8.0 mA                                    | 4.5                 | –    | –    | 0.44 | V    |
| I <sub>LI</sub>                            | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 5.5                 | –    | –    | 1.0  | μA   |
| I <sub>CC</sub>                            | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                        | 5.5                 | –    | –    | 10   | μA   |
| ΔI <sub>CC</sub>                           | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A | 5.5                 | –    | –    | 1.5  | mA   |
| C <sub>I</sub>                             | input capacitance                                 |  | –                   | –    | –    | 10   | pF   |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |   |  |                     |      |      |      |      |
| V <sub>OH</sub>                            | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | 4.4  | –    | –    | V    |
|  |   | I <sub>O</sub> = –50 μA<br>I <sub>O</sub> = –8.0 mA                                  | 4.5                 | 3.70 | –    | –    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 4.5                 | –    | –    | 0.1  | V    |
|  |   | I <sub>O</sub> = 50 μA<br>I <sub>O</sub> = 8.0 mA                                    | 4.5                 | –    | –    | 0.55 | V    |
| I <sub>LI</sub>                            | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                  | 5.5                 | –    | –    | 2.0  | μA   |
| I <sub>CC</sub>                            | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A                        | 5.5                 | –    | –    | 40   | μA   |
| ΔI <sub>CC</sub>                           | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A | 5.5                 | –    | –    | 1.5  | mA   |
| C <sub>I</sub>                             | input capacitance                                 |  | –                   | –    | –    | 10   | pF   |



## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## TRANSFER CHARACTERISTICS

## Type 74AHC3G14

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

| SYMBOL                                     | PARAMETER                                       | TEST CONDITIONS  |                     | MIN. | TYP. | MAX. | UNIT |
|--|---|------------------|---------------------|------|------|------|------|
|  |   | WAVEFORMS        | V <sub>CC</sub> (V) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>             |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 3.0                 | –    | –    | 2.2  | V    |
|  |   |                  | 4.5                 | –    | –    | 3.15 | V    |
|  |   |                  | 5.5                 | –    | –    | 3.85 | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 3.0                 | 0.9  | –    | –    | V    |
|  |   |                  | 4.5                 | 1.35 | –    | –    | V    |
|  |   |                  | 5.5                 | 1.65 | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 3.0                 | 0.3  | –    | 1.2  | V    |
|  |   |                  | 4.5                 | 0.4  | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.5  | –    | 1.6  | V    |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 3.0                 | –    | –    | 2.2  | V    |
|  |   |                  | 4.5                 | –    | –    | 3.15 | V    |
|  |   |                  | 5.5                 | –    | –    | 3.85 | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 3.0                 | 0.9  | –    | –    | V    |
|  |   |                  | 4.5                 | 1.35 | –    | –    | V    |
|  |   |                  | 5.5                 | 1.65 | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 3.0                 | 0.3  | –    | 1.2  | V    |
|  |   |                  | 4.5                 | 0.4  | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.5  | –    | 1.6  | V    |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 3.0                 | –    | –    | 2.2  | V    |
|  |   |                  | 4.5                 | –    | –    | 3.15 | V    |
|  |   |                  | 5.5                 | –    | –    | 3.85 | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 3.0                 | 0.9  | –    | –    | V    |
|  |   |                  | 4.5                 | 1.35 | –    | –    | V    |
|  |   |                  | 5.5                 | 1.65 | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 3.0                 | 0.25 | –    | 1.2  | V    |
|  |   |                  | 4.5                 | 0.35 | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.45 | –    | 1.6  | V    |

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

**Type 74AHCT3G14**

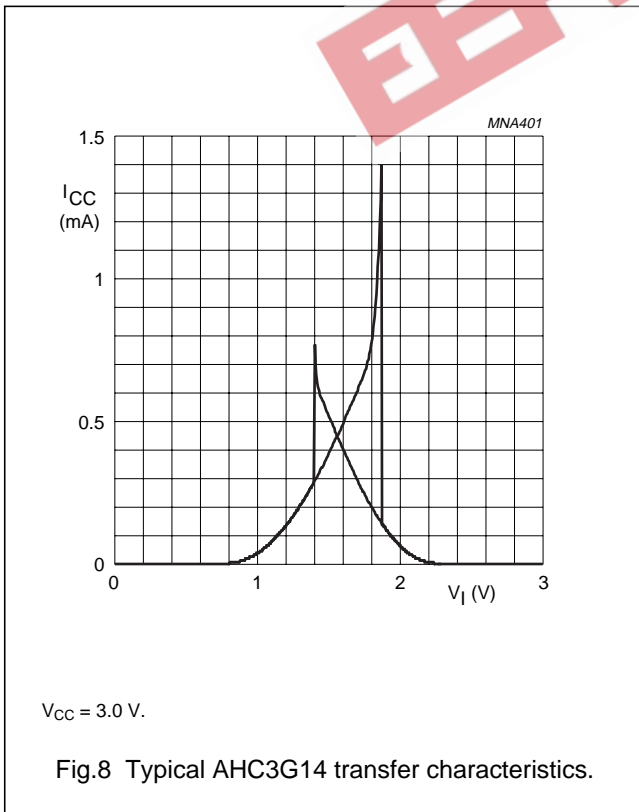
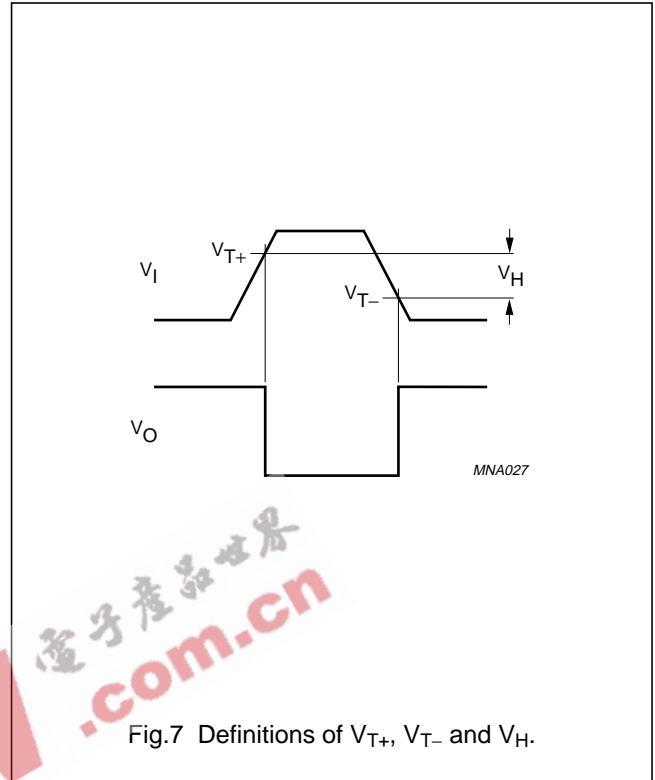
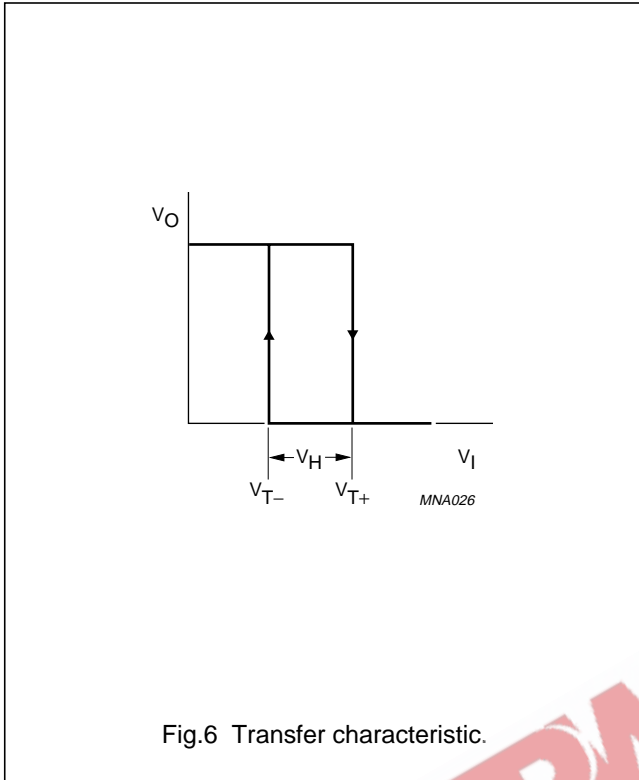
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| SYMBOL                                     | PARAMETER                                       | TEST CONDITIONS  |                     | MIN. | TYP. | MAX. | UNIT |
|--|---|------------------|---------------------|------|------|------|------|
|  |   | WAVEFORMS        | V <sub>CC</sub> (V) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>             |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 4.5                 | –    | –    | 2.0  | V    |
|  |   |                  | 5.5                 | –    | –    | 2.0  | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 4.5                 | 0.5  | –    | –    | V    |
|  |   |                  | 5.5                 | 0.6  | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 4.5                 | 0.4  | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.4  | –    | 1.6  | V    |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 4.5                 | –    | –    | 2.0  | V    |
|  |   |                  | 5.5                 | –    | –    | 2.0  | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 4.5                 | 0.5  | –    | –    | V    |
|  |   |                  | 5.5                 | 0.6  | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 4.5                 | 0.4  | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.4  | –    | 1.6  | V    |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |   |                  |                     |      |      |      |      |
| V <sub>T+</sub>                            | positive-going threshold                        | see Figs 6 and 7 | 4.5                 | –    | –    | 2.0  | V    |
|  |   |                  | 5.5                 | –    | –    | 2.0  | V    |
| V <sub>T-</sub>                            | negative-going threshold                        | see Figs 6 and 7 | 4.5                 | 0.5  | –    | –    | V    |
|  |   |                  | 5.5                 | 0.6  | –    | –    | V    |
| V <sub>H</sub>                             | hysteresis (V <sub>T+</sub> – V <sub>T-</sub> ) | see Figs 6 and 7 | 4.5                 | 0.35 | –    | 1.4  | V    |
|  |   |                  | 5.5                 | 0.35 | –    | 1.6  | V    |

Inverting Schmitt trigger

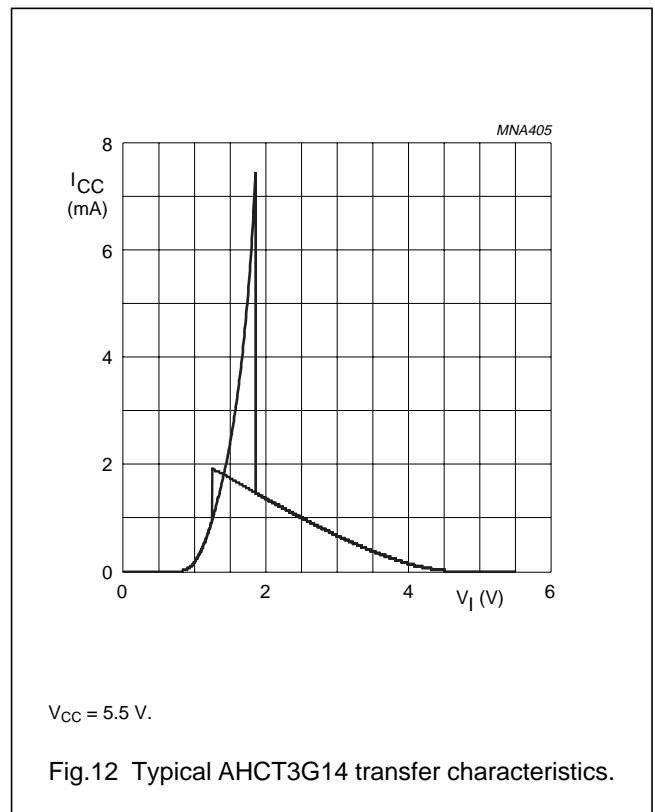
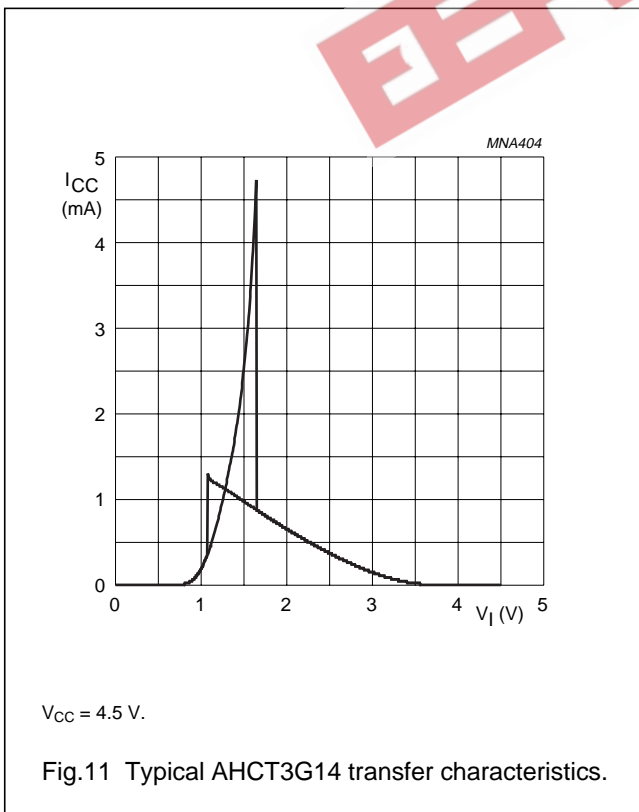
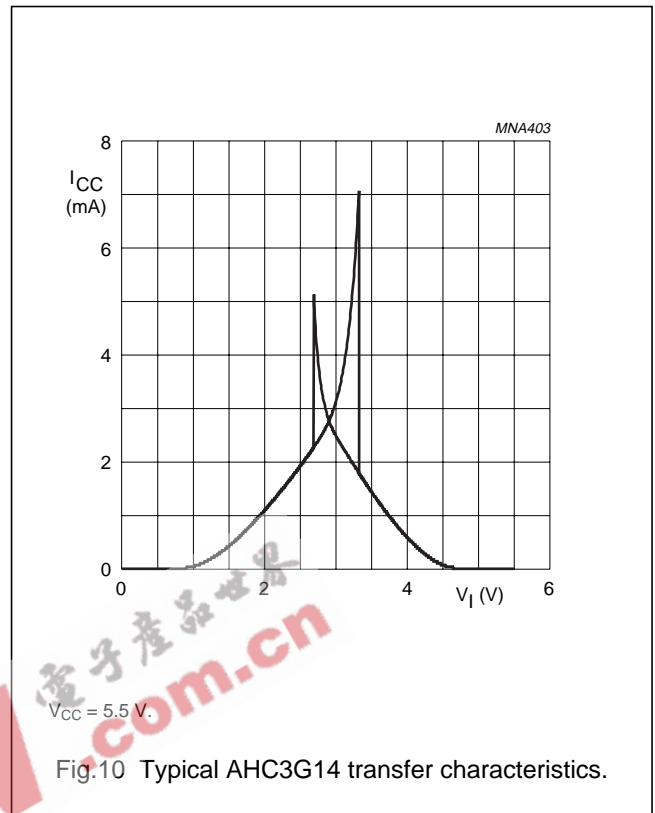
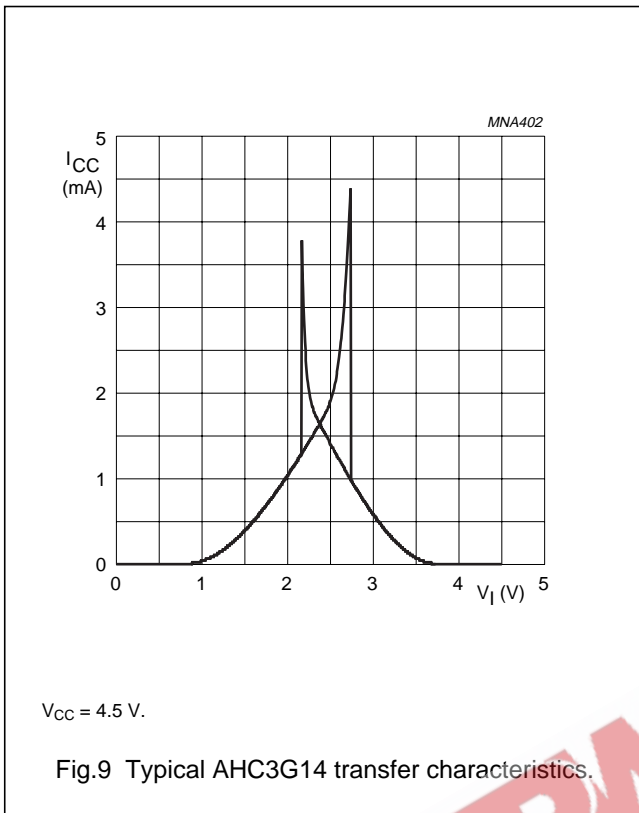
74AHC3G14; 74AHCT3G14

TRANSFER CHARACTERISTIC WAVEFORMS



### Inverting Schmitt trigger

### 74AHC3G14; 74AHCT3G14



## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## AC CHARACTERISTICS

## Type 74AHC3G14

GND = 0 V;  $t_r = t_f \leq 3.0$  ns.

| SYMBOL                                     | PARAMETER                  | TEST CONDITIONS    |                     |                     | MIN. | TYP. | MAX. | UNIT |
|--|----------------------------|--------------------|---------------------|---------------------|------|------|------|------|
|  |                            | WAVEFORMS          | V <sub>CC</sub> (V) | C <sub>L</sub> (pF) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>             |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 3.3                 | 15                  | –    | 4.2  | –    | ns   |
|  |                            |                    |                     | 50                  | –    | 6.0  | –    | ns   |
|  |                            |                    | 3.0 to 3.6          | 15                  | –    | –    | 12.8 | ns   |
|  |                            |                    |                     | 50                  | –    | –    | 16.3 | ns   |
|  |                            |                    | 5.0                 | 15                  | –    | 3.2  | –    | ns   |
|  |                            |                    |                     | 50                  | –    | 4.6  | –    | ns   |
|  |                            |                    | 4.5 to 5.5          | 15                  | –    | –    | 8.6  | ns   |
|  |                            |                    |                     | 50                  | –    | –    | 10.6 | ns   |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 3.0 to 3.6          | 15                  | 1.0  | –    | 15.0 | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 18.5 | ns   |
|  |                            |                    | 4.5 to 5.5          | 15                  | 1.0  | –    | 10.0 | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 12.0 | ns   |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 3.0 to 3.6          | 15                  | 1.0  | –    | 16.5 | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 20.5 | ns   |
|  |                            |                    | 4.5 to 5.5          | 15                  | 1.0  | –    | 11.0 | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 13.5 | ns   |

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

**Type 74AHCT3G14**GND = 0 V;  $t_r = t_f \leq 3.0$  ns.

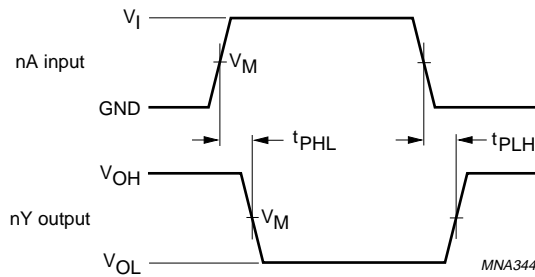
| SYMBOL                                     | PARAMETER                  | TEST CONDITIONS    |                     |                     | MIN. | TYP. | MAX. | UNIT |
|--|----------------------------|--------------------|---------------------|---------------------|------|------|------|------|
|  |                            | WAVEFORMS          | V <sub>CC</sub> (V) | C <sub>L</sub> (pF) |      |      |      |      |
| <b>T<sub>amb</sub> = 25 °C</b>             |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 5                   | 15                  | –    | 4.1  | –    | ns   |
|  |                            |                    |                     | 50                  | –    | 5.9  | –    | ns   |
|  |                            |                    | 4.5 to 5.5          | 15                  | –    | –    | 7.0  | ns   |
|  |                            |                    |                     | 50                  | –    | –    | 8.5  | ns   |
| <b>T<sub>amb</sub> = –40 °C to +85 °C</b>  |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 4.5 to 5.5          | 15                  | 1.0  | –    | 8.0  | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 10.0 | ns   |
| <b>T<sub>amb</sub> = –40 °C to +125 °C</b> |                            |                    |                     |                     |      |      |      |      |
| t <sub>PHL</sub> /t <sub>PLH</sub>         | propagation delay nA to nY | see Figs 13 and 14 | 4.5 to 5.5          | 15                  | 1.0  | –    | 9.0  | ns   |
|  |                            |                    |                     | 50                  | 1.0  | –    | 11.0 | ns   |

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Inverting Schmitt trigger

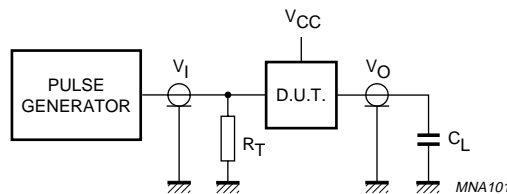
74AHC3G14; 74AHCT3G14

AC WAVEFORMS



| FAMILY | V <sub>I</sub> INPUT REQUIREMENTS | V <sub>M</sub> INPUT | V <sub>M</sub> OUTPUT |
|--------|-----------------------------------|----------------------|-----------------------|
| AHC3G  | GND to V <sub>CC</sub>            | 50 % V <sub>CC</sub> | 50 % V <sub>CC</sub>  |
| AHCT3G | GND to 3.0 V                      | 1.5 V                | 50 % V <sub>CC</sub>  |

Fig.13 The input (nA) to output (nY) propagation delays.



Definitions for test circuit:

C<sub>L</sub> = Load capacitance including jig and probe capacitance. (See Chapter "AC characteristics" for values).

R<sub>T</sub> = Termination resistance should be equal to the output impedance Z<sub>o</sub> of the pulse generator.

Fig.14 Load circuitry for switching times.

# Inverting Schmitt trigger

# 74AHC3G14; 74AHCT3G14

### APPLICATION INFORMATION

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

$$P_{ad} = f_i \times (t_r \times I_{CC(AV)} + t_f \times I_{CC(AV)}) \times V_{CC}$$

Where:

$P_{ad}$  = additional power dissipation ( $\mu W$ );

$f_i$  = input frequency (MHz);

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

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

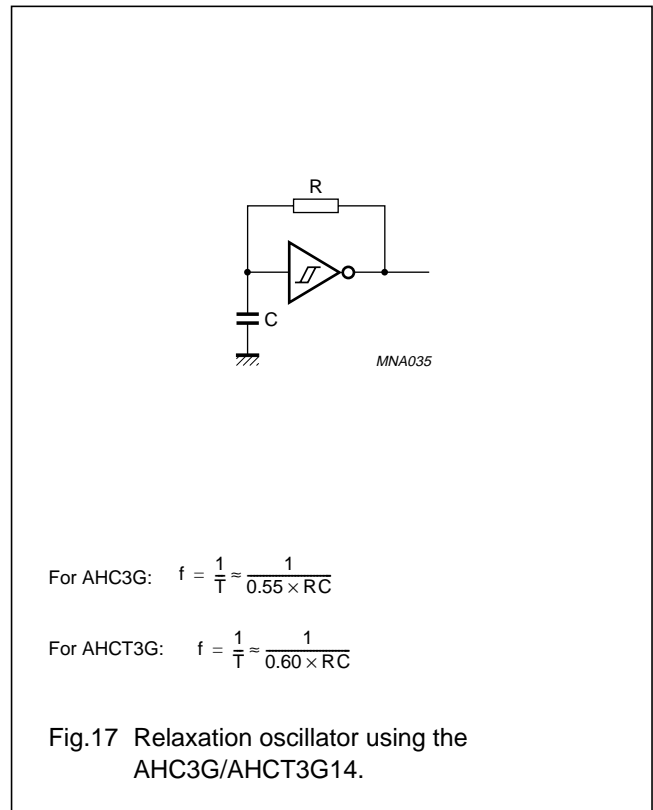
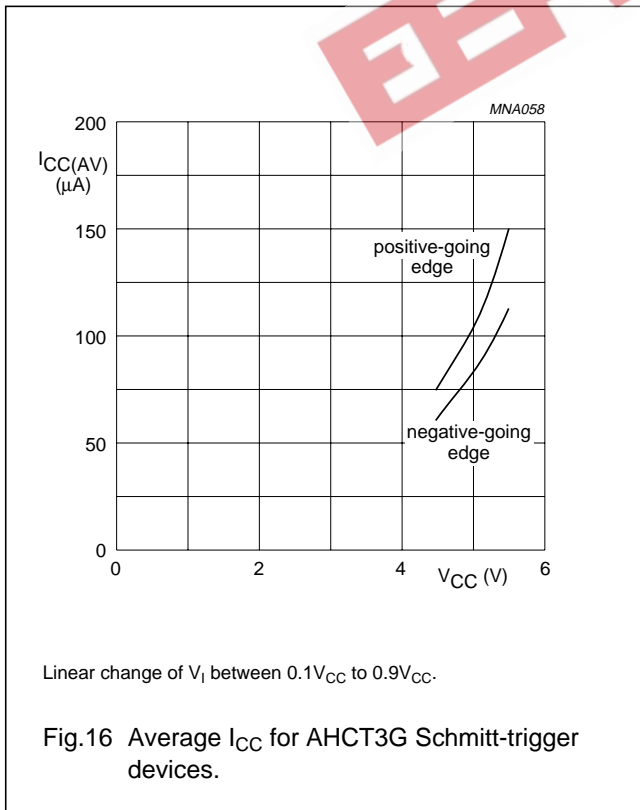
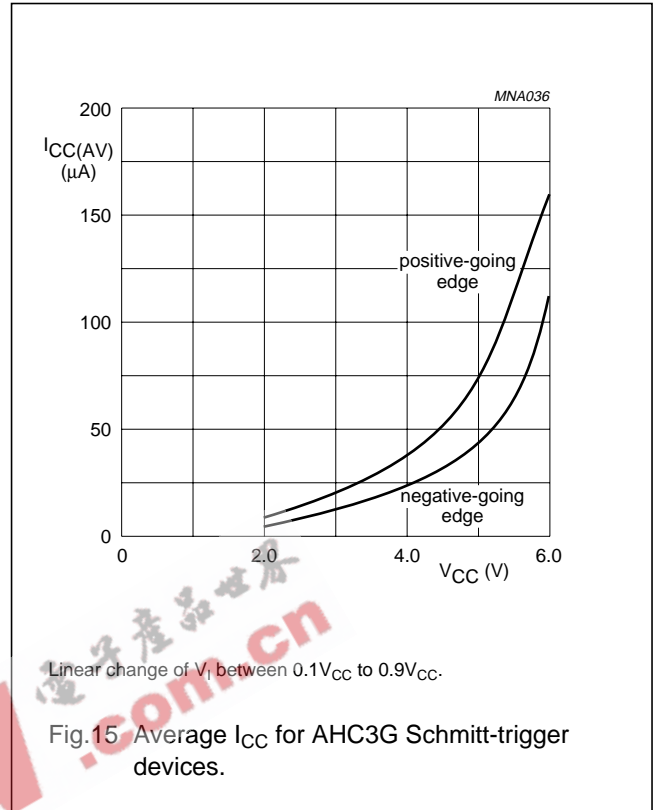
$I_{CC(AV)}$  = average additional supply current ( $\mu A$ ).

Average  $I_{CC}$  differs with positive or negative input transitions, as shown in Figs 15 and 16.

For AHC3G/AHCT3G14 used in relaxation oscillator circuit, see Fig.17.

### Remark to the application information

All values given are typical unless otherwise specified.



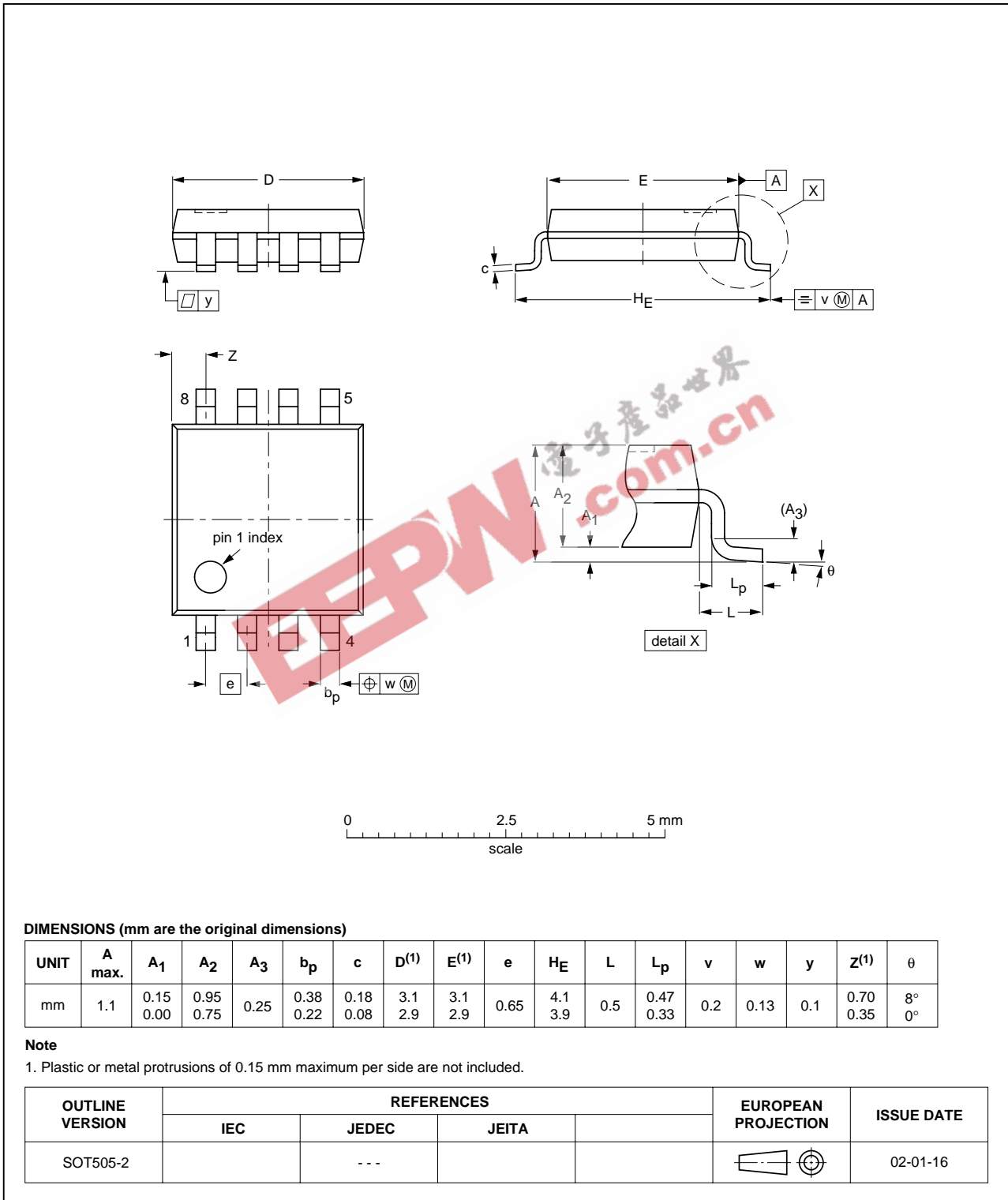


Inverting Schmitt trigger

74AHC3G14; 74AHCT3G14

PACKAGE OUTLINES

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

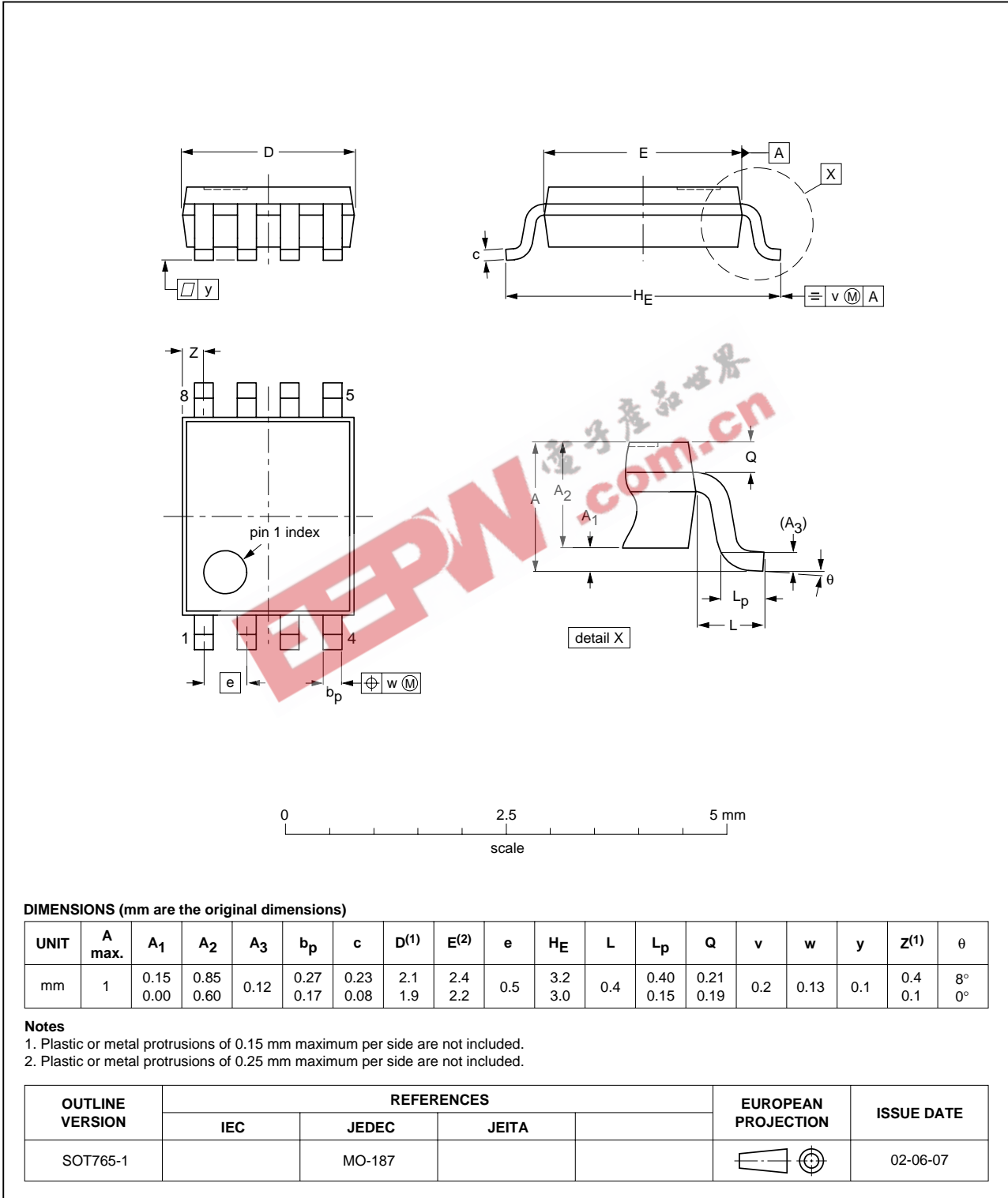


Inverting Schmitt trigger

74AHC3G14; 74AHCT3G14

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

SOT765-1

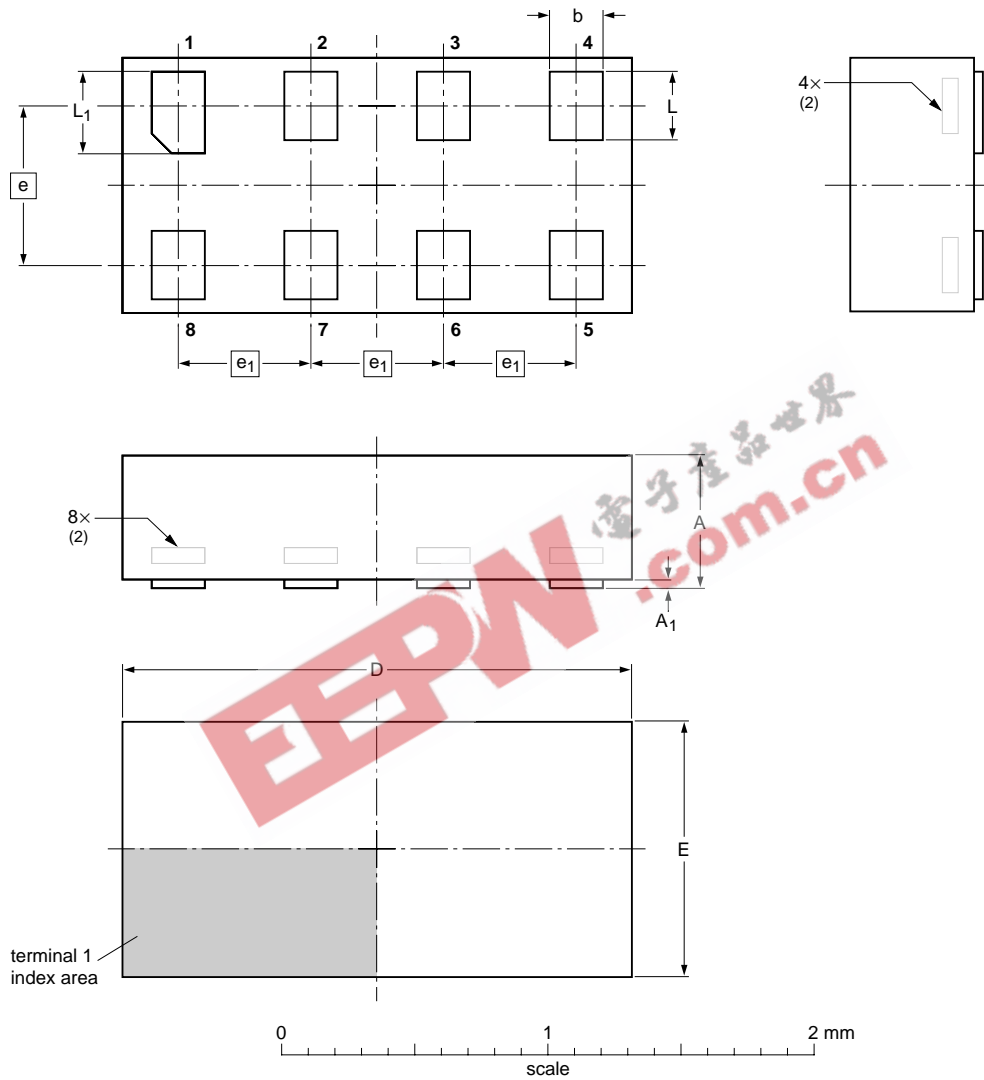


Inverting Schmitt trigger

74AHC3G14; 74AHCT3G14

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 0.95 x 1.95 x 0.5 mm

SOT833-1



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

| UNIT | A <sup>(1)</sup><br>max | A <sub>1</sub><br>max | b            | D          | E          | e   | e <sub>1</sub> | L            | L <sub>1</sub> |
|------|-------------------------|-----------------------|--------------|------------|------------|-----|----------------|--------------|----------------|
| mm   | 0.5                     | 0.04                  | 0.25<br>0.17 | 2.0<br>1.9 | 1.0<br>0.9 | 0.6 | 0.5            | 0.35<br>0.27 | 0.40<br>0.32   |

**Notes**

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

| OUTLINE VERSION | REFERENCES |        |       | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|--------|-------|---------------------|----------------------|
|                 | IEC        | JEDEC  | JEITA |                     |                      |
| SOT833-1        | ---        | MO-252 | ---   |                     | 04-07-15<br>04-07-22 |

## Inverting Schmitt trigger

## 74AHC3G14; 74AHCT3G14

## DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)(3)</sup> | 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). |

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