

# 74LVC1G123-Q100

Single retriggerable monostable multivibrator;  
Schmitt trigger inputs

Rev. 3 — 2 November 2018

Product data sheet

## 1. General description

The 74LVC1G123-Q100 is a single retriggerable monostable multivibrator with Schmitt trigger inputs. Output pulse width is controlled by three methods:

1. The basic pulse is programmed by selection of an external resistor ( $R_{EXT}$ ) and capacitor ( $C_{EXT}$ ).
2. Once triggered, the basic output pulse width may be extended by retriggering the gated active LOW-going edge input ( $\overline{A}$ ) or the active HIGH-going edge input (B). By repeating this process, the output pulse period ( $Q = \text{HIGH}$ ) can be made as long as desired. Alternatively an output delay can be terminated at any time by a LOW-going edge on input  $\overline{CLR}$ , which also inhibits the triggering.
3. An internal connection from  $\overline{CLR}$  to the input gates makes it possible to trigger the circuit by a HIGH-going signal at input  $\overline{CLR}$ .

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in a mixed 3.3 V and 5 V environment. Schmitt trigger inputs, makes the circuit highly tolerant to slower input rise and fall times.

This device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

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
- Wide supply voltage range from 1.65 V to 5.5 V
- High noise immunity
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- CMOS low power consumption
- DC triggered from active HIGH or active LOW inputs
- Retriggerable for very long pulses up to 100 % duty factor
- Direct reset terminates output pulse
- Schmitt trigger on all inputs
- 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)
- Power-on-reset on outputs
- Latch-up performance exceeds 100 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5.5 V
- 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,  $R = 0$   $\Omega$ )

3. Ordering information

Table 1. Ordering information

| Type number       | Package           |        |                                                                                         |          |
|-------------------|-------------------|--------|-----------------------------------------------------------------------------------------|----------|
|                   | Temperature range | Name   | Description                                                                             | Version  |
| 74LVC1G123DP-Q100 | -40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm | SOT505-2 |
| 74LVC1G123DC-Q100 | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm              | SOT765-1 |

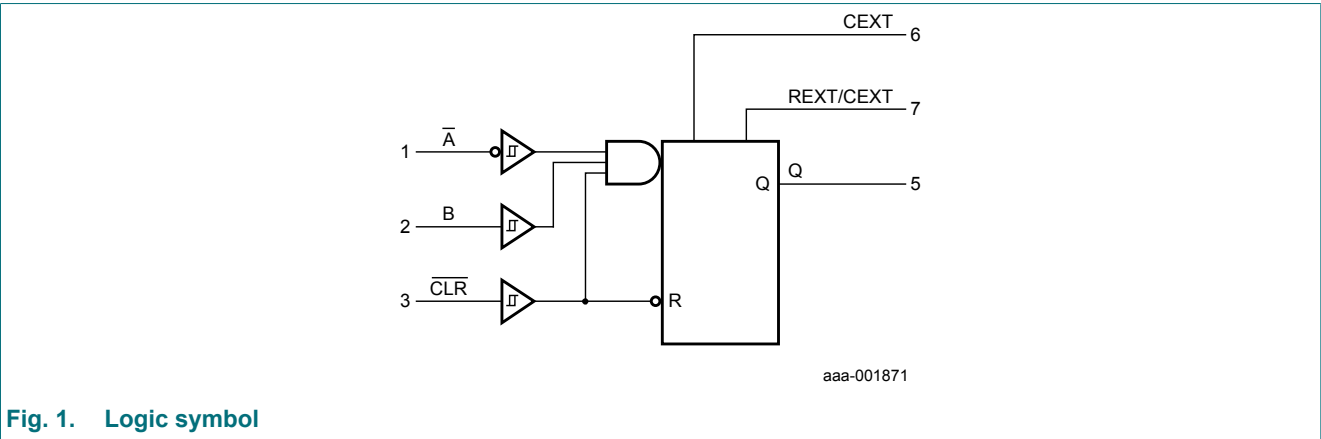
4. Marking

Table 2. Marking codes

| Type number       | Marking code[1] |
|-------------------|-----------------|
| 74LVC1G123DP-Q100 | Y3              |
| 74LVC1G123DC-Q100 | Y3              |

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

5. Functional diagram



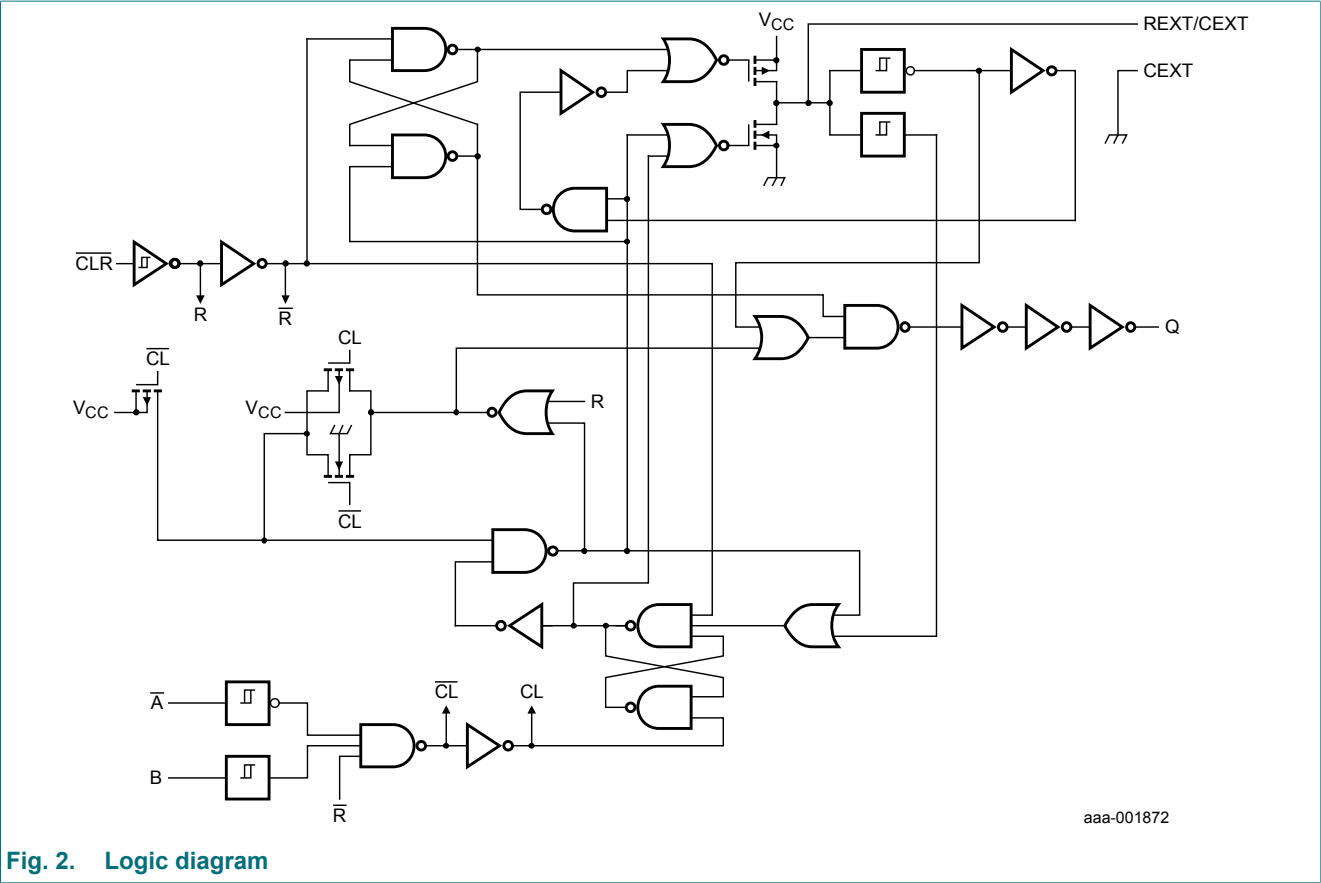


Fig. 2. Logic diagram

6. Pinning information

6.1. Pinning

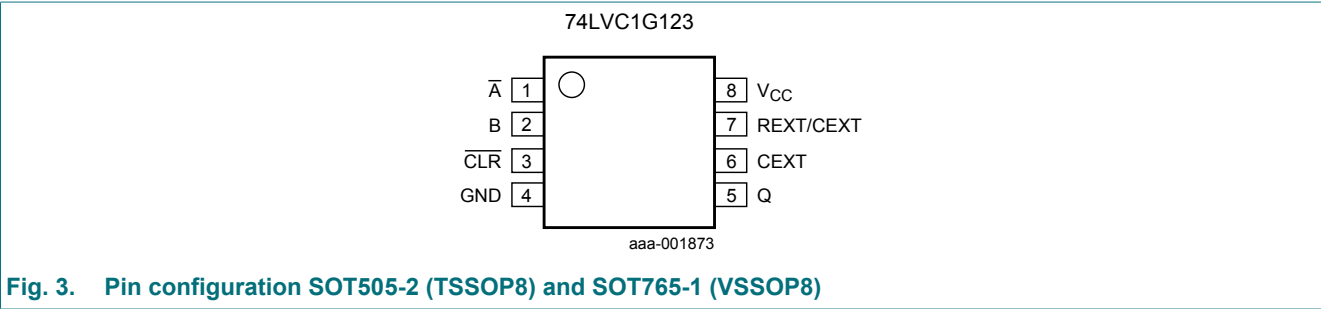


Fig. 3. Pin configuration SOT505-2 (TSSOP8) and SOT765-1 (VSSOP8)

## 6.2. Pin description

Table 3. Pin description

| Symbol          | Pin | Description                                        |
|-----------------|-----|----------------------------------------------------|
| A               | 1   | negative-edge triggered input                      |
| B               | 2   | positive-edge triggered input                      |
| CLR             | 3   | direct reset LOW and positive-edge triggered input |
| GND             | 4   | ground (0 V)                                       |
| Q               | 5   | active HIGH output                                 |
| CEXT            | 6   | external capacitor connection                      |
| REXT/CEXT       | 7   | external resistor and capacitor connection         |
| V <sub>CC</sub> | 8   | supply voltage                                     |

## 7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; ↑ = LOW-to-HIGH transition; ↓ = HIGH-to-LOW transition;  = one HIGH level output pulse.

| Input |   |   | Output                                                                                |
|-------|---|---|---------------------------------------------------------------------------------------|
| CLR   | A | B | Q                                                                                     |
| L     | X | X | L                                                                                     |
| X     | H | X | L[1]                                                                                  |
| X     | X | L | L[1]                                                                                  |
| H     | L | ↑ |  |
| H     | ↓ | H |  |
| ↑     | L | H |  |

[1] If the monostable was triggered before this condition was established, the pulse continues as programmed.

## 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 <sub>CC</sub>  | supply voltage          |                                                          | -0.5 | +6.5                  | V    |
| V <sub>I</sub>   | input voltage           | [1]                                                      | -0.5 | +6.5                  | V    |
| V <sub>O</sub>   | output voltage          | Active mode [1]                                          | -0.5 | V <sub>CC</sub> + 0.5 | V    |
|                  |                         | Power-down mode [1][2]                                   | -0.5 | +6.5                  | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0 V                                     | -50  | -                     | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < 0 V or V <sub>O</sub> > V <sub>CC</sub> | -    | ±50                   | mA   |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = 0 V to V <sub>CC</sub>                  | -    | ±50                   | mA   |
| I <sub>CC</sub>  | supply current          |                                                          | -    | 100                   | mA   |
| I <sub>GND</sub> | ground current          |                                                          | -100 | -                     | mA   |
| T <sub>stg</sub> | storage temperature     |                                                          | -65  | +150                  | °C   |

## Single retriggerable monostable multivibrator; Schmitt trigger inputs

| Symbol           | Parameter               | Conditions                                                                           | Min | Max | Unit |
|------------------|-------------------------|--------------------------------------------------------------------------------------|-----|-----|------|
| $P_{\text{tot}}$ | total power dissipation | $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ [3] | -   | 300 | mW   |

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

[2] When  $V_{\text{CC}} = 0\text{ V}$  (Power-down mode), the output voltage can be 5.5 V in normal operation.

[3] For TSSOP8 package: above  $55\text{ }^{\circ}\text{C}$  the value of  $P_{\text{tot}}$  derates linearly with 2.5 mW/K.

For VSSOP8 package: above  $110\text{ }^{\circ}\text{C}$  the value of  $P_{\text{tot}}$  derates linearly with 8 mW/K.

## 9. Recommended operating conditions

Table 6. Operating conditions

| Symbol              | Parameter                           | Conditions                                        | Min  | Max             | Unit               |
|---------------------|-------------------------------------|---------------------------------------------------|------|-----------------|--------------------|
| $V_{\text{CC}}$     | supply voltage                      |                                                   | 1.65 | 5.5             | V                  |
| $V_{\text{I}}$      | input voltage                       |                                                   | 0    | 5.5             | V                  |
| $V_{\text{O}}$      | output voltage                      | Active mode                                       | 0    | $V_{\text{CC}}$ | V                  |
|                     |                                     | Power-down mode                                   | 0    | 5.5             | V                  |
| $T_{\text{amb}}$    | ambient temperature                 |                                                   | -40  | +125            | $^{\circ}\text{C}$ |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{\text{CC}} = 1.65\text{ V}$ to $5.5\text{ V}$ | -    | 1               | ms/V               |

## 10. Static characteristics

Table 7. Static characteristics

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

| Symbol                                                                          | Parameter                 | Conditions                                                                                   | Min                   | Typ[1] | Max     | Unit          |
|---------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------|-----------------------|--------|---------|---------------|
| $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ |                           |                                                                                              |                       |        |         |               |
| $V_{\text{OH}}$                                                                 | HIGH-level output voltage | $V_{\text{I}} = V_{\text{T+}}$ or $V_{\text{T-}}$                                            |                       |        |         |               |
|                                                                                 |                           | $I_{\text{O}} = -100\text{ }\mu\text{A}$ ; $V_{\text{CC}} = 1.65\text{ V}$ to $5.5\text{ V}$ | $V_{\text{CC}} - 0.1$ | -      | -       | V             |
|                                                                                 |                           | $I_{\text{O}} = -4\text{ mA}$ ; $V_{\text{CC}} = 1.65\text{ V}$                              | 1.2                   | -      | -       | V             |
|                                                                                 |                           | $I_{\text{O}} = -8\text{ mA}$ ; $V_{\text{CC}} = 2.3\text{ V}$                               | 1.9                   | -      | -       | V             |
|                                                                                 |                           | $I_{\text{O}} = -12\text{ mA}$ ; $V_{\text{CC}} = 2.7\text{ V}$                              | 2.2                   | -      | -       | V             |
|                                                                                 |                           | $I_{\text{O}} = -24\text{ mA}$ ; $V_{\text{CC}} = 3.0\text{ V}$                              | 2.4                   | -      | -       | V             |
|                                                                                 |                           | $I_{\text{O}} = -32\text{ mA}$ ; $V_{\text{CC}} = 4.5\text{ V}$                              | 3.8                   | -      | -       | V             |
| $V_{\text{OL}}$                                                                 | LOW-level output voltage  | $V_{\text{I}} = V_{\text{T+}}$ or $V_{\text{T-}}$                                            |                       |        |         |               |
|                                                                                 |                           | $I_{\text{O}} = 100\text{ }\mu\text{A}$ ; $V_{\text{CC}} = 1.65\text{ V}$ to $5.5\text{ V}$  | -                     | -      | 0.1     | V             |
|                                                                                 |                           | $I_{\text{O}} = 4\text{ mA}$ ; $V_{\text{CC}} = 1.65\text{ V}$                               | -                     | -      | 0.45    | V             |
|                                                                                 |                           | $I_{\text{O}} = 8\text{ mA}$ ; $V_{\text{CC}} = 2.3\text{ V}$                                | -                     | -      | 0.3     | V             |
|                                                                                 |                           | $I_{\text{O}} = 12\text{ mA}$ ; $V_{\text{CC}} = 2.7\text{ V}$                               | -                     | -      | 0.4     | V             |
|                                                                                 |                           | $I_{\text{O}} = 24\text{ mA}$ ; $V_{\text{CC}} = 3.0\text{ V}$                               | -                     | -      | 0.55    | V             |
|                                                                                 |                           | $I_{\text{O}} = 32\text{ mA}$ ; $V_{\text{CC}} = 4.5\text{ V}$                               | -                     | -      | 0.55    | V             |
| $I_{\text{I}}$                                                                  | input leakage current     | $V_{\text{I}} = 5.5\text{ V}$ or GND; $V_{\text{CC}} = 0\text{ V}$ to $5.5\text{ V}$         | -                     | -      | $\pm 2$ | $\mu\text{A}$ |
| $I_{\text{OFF}}$                                                                | power-off leakage current | $V_{\text{I}}$ or $V_{\text{O}} = 5.5\text{ V}$ ; $V_{\text{CC}} = 0\text{ V}$               | -                     | -      | $\pm 2$ | $\mu\text{A}$ |

## Single retriggerable monostable multivibrator; Schmitt trigger inputs

| Symbol                                                                                   | Parameter                 | Conditions                                                                   | Min            | Typ[1] | Max      | Unit          |
|------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------|----------------|--------|----------|---------------|
| $I_{CC}$                                                                                 | supply current            | $V_I = 5.5 \text{ V or GND};$                                                |                |        |          |               |
|                                                                                          |                           | Quiescent; $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$    | -              | 0.1    | 10       | $\mu\text{A}$ |
|                                                                                          |                           | Active state; $R_{EXT}/C_{EXT} = 0.5V_{CC}$                                  |                |        |          |               |
|                                                                                          |                           | $V_{CC} = 1.65 \text{ V}$                                                    | -              | -      | 80       | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 2.3 \text{ V}$                                                     | -              | -      | 130      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 3 \text{ V}$                                                       | -              | -      | 240      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 4.5 \text{ V}$                                                     | -              | -      | 400      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 5.5 \text{ V}$                                                     | -              | -      | 650      | $\mu\text{A}$ |
| $C_I$                                                                                    | input capacitance         |                                                                              | -              | 2.0    | -        | pF            |
| <b><math>T_{amb} = -40 \text{ }^\circ\text{C to } +125 \text{ }^\circ\text{C}</math></b> |                           |                                                                              |                |        |          |               |
| $V_{OH}$                                                                                 | HIGH-level output voltage | $V_I = V_{T+} \text{ or } V_{T-}$                                            |                |        |          |               |
|                                                                                          |                           | $I_O = -100 \text{ } \mu\text{A}; V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$ | $V_{CC} - 0.1$ | -      | -        | V             |
|                                                                                          |                           | $I_O = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$                               | 1.2            | -      | -        | V             |
|                                                                                          |                           | $I_O = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$                                | 1.9            | -      | -        | V             |
|                                                                                          |                           | $I_O = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$                               | 2.2            | -      | -        | V             |
|                                                                                          |                           | $I_O = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$                               | 2.4            | -      | -        | V             |
|                                                                                          |                           | $I_O = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$                               | 3.8            | -      | -        | V             |
| $V_{OL}$                                                                                 | LOW-level output voltage  | $V_I = V_{T+} \text{ or } V_{T-}$                                            |                |        |          |               |
|                                                                                          |                           | $I_O = 100 \text{ } \mu\text{A}; V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$  | -              | -      | 0.1      | V             |
|                                                                                          |                           | $I_O = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$                                | -              | -      | 0.45     | V             |
|                                                                                          |                           | $I_O = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$                                 | -              | -      | 0.3      | V             |
|                                                                                          |                           | $I_O = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$                                | -              | -      | 0.4      | V             |
|                                                                                          |                           | $I_O = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$                                | -              | -      | 0.55     | V             |
|                                                                                          |                           | $I_O = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$                                | -              | -      | 0.55     | V             |
| $I_I$                                                                                    | input leakage current     | $V_I = 5.5 \text{ V or GND}; V_{CC} = 0 \text{ V to } 5.5 \text{ V}$         | -              | -      | $\pm 10$ | $\mu\text{A}$ |
| $I_{OFF}$                                                                                | power-off leakage current | $V_I \text{ or } V_O = 5.5 \text{ V}; V_{CC} = 0 \text{ V}$                  | -              | -      | $\pm 10$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                 | supply current            | $V_I = 5.5 \text{ V or GND};$                                                |                |        |          |               |
|                                                                                          |                           | Quiescent; $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$    | -              | -      | 20       | $\mu\text{A}$ |
|                                                                                          |                           | Active state; $R_{EXT}/C_{EXT} = 0.5V_{CC}$                                  |                |        |          |               |
|                                                                                          |                           | $V_{CC} = 1.65 \text{ V}$                                                    | -              | -      | 80       | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 2.3 \text{ V}$                                                     | -              | -      | 130      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 3 \text{ V}$                                                       | -              | -      | 240      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 4.5 \text{ V}$                                                     | -              | -      | 400      | $\mu\text{A}$ |
|                                                                                          |                           | $V_{CC} = 5.5 \text{ V}$                                                     | -              | -      | 650      | $\mu\text{A}$ |

[1] All typical values are measured at  $T_{amb} = 25 \text{ }^\circ\text{C}$ .

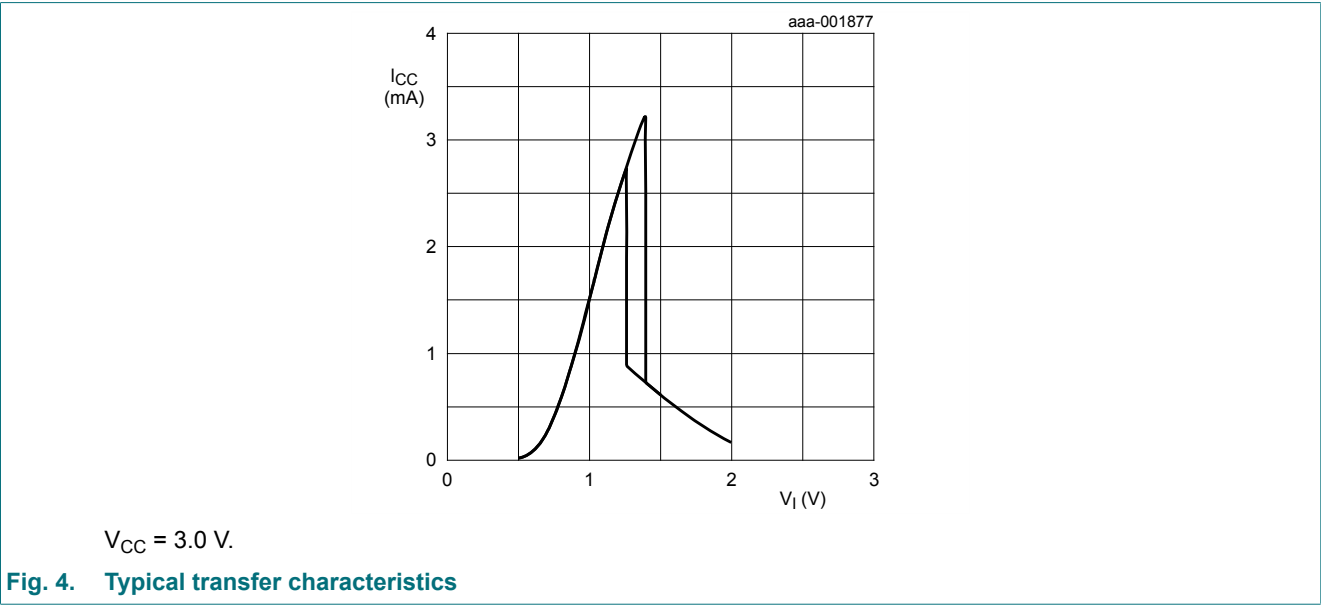
Table 8. Transfer characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 16.

| Symbol          | Parameter                        | Conditions                                                                                      | -40 °C to +85 °C |        |      | -40 °C to +125 °C |      | Unit |
|-----------------|----------------------------------|-------------------------------------------------------------------------------------------------|------------------|--------|------|-------------------|------|------|
|                 |                                  |                                                                                                 | Min              | Typ[1] | Max  | Min               | Max  |      |
| V <sub>T+</sub> | positive-going threshold voltage | $\overline{A}$ , B and $\overline{CLR}$ input; see Fig. 4                                       |                  |        |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 1.65 V to 1.95 V                                                              | 0.72             | 0.98   | 1.22 | 0.71              | 1.22 | V    |
|                 |                                  | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 0.97             | 1.26   | 1.52 | 0.97              | 1.52 | V    |
|                 |                                  | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                | 1.20             | 1.58   | 1.90 | 1.20              | 1.90 | V    |
|                 |                                  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                | 1.74             | 2.27   | 2.75 | 1.74              | 2.78 | V    |
| V <sub>T-</sub> | negative-going threshold voltage | $\overline{A}$ , B and $\overline{CLR}$ input; see Fig. 4                                       |                  |        |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 1.65 V to 1.95 V                                                              | 0.56             | 0.81   | 1.04 | 0.56              | 1.04 | V    |
|                 |                                  | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 0.83             | 1.09   | 1.33 | 0.82              | 1.33 | V    |
|                 |                                  | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                | 1.08             | 1.40   | 1.70 | 1.08              | 1.72 | V    |
|                 |                                  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                | 1.61             | 2.07   | 2.53 | 1.61              | 2.57 | V    |
| V <sub>H</sub>  | hysteresis voltage               | $\overline{A}$ , B and $\overline{CLR}$ input; (V <sub>T+</sub> - V <sub>T-</sub> ); see Fig. 4 |                  |        |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 1.65 V to 1.95 V                                                              | 61               | 170    | 295  | 54                | 295  | mV   |
|                 |                                  | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                | 41               | 174    | 304  | 41                | 304  | mV   |
|                 |                                  | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                | 40               | 183    | 319  | 40                | 319  | mV   |
|                 |                                  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                | 32               | 199    | 363  | 26                | 363  | mV   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 3.3 V and 5.0 V respectively.

10.1. Waveform transfer characteristics



## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 16.

| Symbol   | Parameter         | Conditions                                    | -40 °C to +85 °C |        |      | -40 °C to +125 °C |      | Unit |
|----------|-------------------|-----------------------------------------------|------------------|--------|------|-------------------|------|------|
|          |                   |                                               | Min              | Typ[1] | Max  | Min               | Max  |      |
| $t_{pd}$ | propagation delay | $\bar{A}$ , B to Q; see Fig. 5 [2]            |                  |        |      |                   |      |      |
|          |                   | $C_L = 15 \text{ pF}$ ;                       |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 2.5              | 7.1    | 16.3 | 2.5               | 17.6 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 1.9              | -      | 10.3 | 1.9               | 11.2 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 1.9              | -      | 8.5  | 1.9               | 9.3  | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 1.5              | -      | 7.6  | 1.5               | 8.3  | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.2              | -      | 5.3  | 1.2               | 5.8  | ns   |
|          |                   | $C_L = 30 \text{ pF or } C_L = 50 \text{ pF}$ |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 2.9              | 7.8    | 17.6 | 2.9               | 19.0 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 2.2              | -      | 11.3 | 2.2               | 12.3 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 2.7              | -      | 10.5 | 2.7               | 11.4 | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 2.0              | -      | 9.5  | 2.0               | 10.3 | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.5              | -      | 6.7  | 1.5               | 7.2  | ns   |
|          |                   | $\bar{CLR}$ to Q; see Fig. 5                  |                  |        |      |                   |      |      |
|          |                   | $C_L = 15 \text{ pF}$ ;                       |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 3.0              | 6.9    | 16.2 | 3.0               | 17.4 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 2.2              | -      | 9.6  | 2.2               | 10.5 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 2.2              | -      | 8.2  | 2.2               | 8.9  | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 2.0              | -      | 7.3  | 2.0               | 8.0  | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.5              | -      | 5.1  | 1.5               | 5.5  | ns   |
|          |                   | $C_L = 30 \text{ pF or } C_L = 50 \text{ pF}$ |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 3.3              | 7.5    | 17.2 | 3.8               | 18.6 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 2.5              | -      | 10.3 | 2.0               | 11.2 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 2.8              | -      | 9.3  | 2.8               | 10.2 | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 1.5              | -      | 8.4  | 1.5               | 9.2  | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.5              | -      | 6.0  | 1.5               | 6.6  | ns   |
| $t_{pd}$ | propagation delay | $\bar{CLR}$ to Q (trigger); see Fig. 5 [2]    |                  |        |      |                   |      |      |
|          |                   | $C_L = 15 \text{ pF}$ ;                       |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 2.7              | 7.6    | 17.4 | 2.7               | 18.9 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 2.1              | -      | 11.0 | 2.1               | 12.0 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 2.1              | -      | 9.2  | 2.1               | 10.0 | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 1.7              | -      | 8.2  | 1.7               | 8.9  | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.4              | -      | 5.9  | 1.4               | 6.4  | ns   |
|          |                   | $C_L = 30 \text{ pF or } C_L = 50 \text{ pF}$ |                  |        |      |                   |      |      |
|          |                   | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$  | 3.1              | 8.3    | 18.8 | 3.3               | 20.3 | ns   |
|          |                   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$    | 2.5              | -      | 12.0 | 2.5               | 13.1 | ns   |
|          |                   | $V_{CC} = 2.7 \text{ V}$                      | 2.8              | -      | 11.1 | 2.8               | 12.1 | ns   |
|          |                   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$    | 2.0              | -      | 10.1 | 2.0               | 11.0 | ns   |
|          |                   | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$    | 1.5              | -      | 7.1  | 1.5               | 7.7  | ns   |

## Single retriggerable monostable multivibrator; Schmitt trigger inputs

| Symbol | Parameter   | Conditions                                                                                                                            | -40 °C to +85 °C |        |      | -40 °C to +125 °C |      | Unit          |
|--------|-------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------|--------|------|-------------------|------|---------------|
|        |             |                                                                                                                                       | Min              | Typ[1] | Max  | Min               | Max  |               |
| $t_W$  | pulse width | input $\bar{A}$ LOW; B HIGH; see <a href="#">Fig. 5</a> and <a href="#">Fig. 6</a>                                                    |                  |        |      |                   |      |               |
|        |             | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$                                                                                          | 8.0              | -      | -    | 8.0               | -    | ns            |
|        |             | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                                            | 4.0              | -      | -    | 4.0               | -    | ns            |
|        |             | $V_{CC} = 2.7 \text{ V}$                                                                                                              | 3.0              | -      | -    | 3.0               | -    | ns            |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | 3.0              | -      | -    | 3.0               | -    | ns            |
|        |             | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$                                                                                            | 2.5              | -      | -    | 2.5               | -    | ns            |
|        |             | input CLR LOW; see <a href="#">Fig. 5</a> and <a href="#">Fig. 7</a>                                                                  |                  |        |      |                   |      |               |
|        |             | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$                                                                                          | 8.0              | -      | -    | 8.0               | -    | ns            |
|        |             | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                                            | 4.0              | -      | -    | 4.0               | -    | ns            |
|        |             | $V_{CC} = 2.7 \text{ V}$                                                                                                              | 3.0              | -      | -    | 3.0               | -    | ns            |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | 3.0              | -      | -    | 3.0               | -    | ns            |
|        |             | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$                                                                                            | 2.5              | -      | -    | 2.5               | -    | ns            |
| $t_W$  | pulse width | output Q HIGH; see <a href="#">Fig. 5</a> , <a href="#">Fig. 6</a> and <a href="#">Fig. 7</a> ; [3]<br>$R_{EXT} = 10 \text{ k}\Omega$ |                  |        |      |                   |      |               |
|        |             | $C_{EXT} = 100 \text{ pF}$                                                                                                            |                  |        |      |                   |      |               |
|        |             | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$                                                                                          | -                | 1.4    | 2.2  | -                 | 2.2  | $\mu\text{s}$ |
|        |             | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                                            | -                | 1.3    | 1.8  | -                 | 1.8  | $\mu\text{s}$ |
|        |             | $V_{CC} = 2.7 \text{ V}$                                                                                                              | -                | 1.2    | 1.8  | -                 | 1.8  | $\mu\text{s}$ |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | -                | 1.2    | 1.8  | -                 | 1.8  | $\mu\text{s}$ |
|        |             | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$                                                                                            | -                | 1.2    | 1.8  | -                 | 1.8  | $\mu\text{s}$ |
|        |             | $C_{EXT} = 0.01 \text{ }\mu\text{F}$ [3]                                                                                              |                  |        |      |                   |      |               |
|        |             | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$                                                                                          | -                | 100    | 110  | -                 | 110  | $\mu\text{s}$ |
|        |             | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$                                                                                            | -                | 100    | 110  | -                 | 110  | $\mu\text{s}$ |
|        |             | $V_{CC} = 2.7 \text{ V}$                                                                                                              | -                | 100    | 110  | -                 | 110  | $\mu\text{s}$ |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | -                | 100    | 110  | -                 | 110  | $\mu\text{s}$ |
|        |             | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$                                                                                            | -                | 100    | 110  | -                 | 110  | $\mu\text{s}$ |
|        |             | $C_{EXT} = 0.1 \text{ }\mu\text{F}$ [3]                                                                                               |                  |        |      |                   |      |               |
|        |             | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$                                                                                          | -                | 1.0    | 1.05 | -                 | 1.05 | ms            |
|        |             | $V_{CC} = 2.7 \text{ V}$                                                                                                              | -                | 1.0    | 1.05 | -                 | 1.05 | ms            |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | -                | 1.0    | 1.05 | -                 | 1.05 | ms            |
|        |             | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$                                                                                            | -                | 1.0    | 1.05 | -                 | 1.05 | ms            |
|        |             | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$                                                                                            | -                | 1.0    | 1.05 | -                 | 1.05 | ms            |

## Single retriggerable monostable multivibrator; Schmitt trigger inputs

| Symbol            | Parameter                     | Conditions                                                         | -40 °C to +85 °C |        |     | -40 °C to +125 °C |     | Unit |
|-------------------|-------------------------------|--------------------------------------------------------------------|------------------|--------|-----|-------------------|-----|------|
|                   |                               |                                                                    | Min              | Typ[1] | Max | Min               | Max |      |
| t <sub>trig</sub> | retrigger time                | $\bar{A}$ , B; see Fig. 6                                          |                  |        |     |                   |     |      |
|                   |                               | C <sub>EXT</sub> = 100 pF; R <sub>EXT</sub> = 5 kΩ                 |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                 | -                | 174    | -   | -                 | -   | ns   |
|                   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                   | -                | 59     | -   | -                 | -   | ns   |
|                   |                               | C <sub>EXT</sub> = 100 pF; R <sub>EXT</sub> = 1 kΩ                 |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                   | -                | 32     | -   | -                 | -   | ns   |
|                   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                   | -                | 20     | -   | -                 | -   | ns   |
|                   |                               | C <sub>EXT</sub> = 100 μF; R <sub>EXT</sub> = 5 kΩ                 |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                 | -                | 14     | -   | -                 | -   | ms   |
|                   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                   | -                | 10     | -   | -                 | -   | ms   |
|                   |                               | C <sub>EXT</sub> = 100 μF; R <sub>EXT</sub> = 1 kΩ                 |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                   | -                | 10     | -   | -                 | -   | ms   |
|                   |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                   | -                | 8      | -   | -                 | -   | ms   |
| R <sub>ext</sub>  | external resistance           | see Fig. 10, Fig. 11 and Fig. 12                                   |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 2.0 V                                            | 5                | -      | -   | -                 | -   | kΩ   |
|                   |                               | V <sub>CC</sub> ≥ 3.0 V                                            | 1                | -      | -   | -                 | -   | kΩ   |
| C <sub>ext</sub>  | external capacitance          | V <sub>CC</sub> = 5.0 V; see Fig. 10, Fig. 11 and Fig. 12          | -                | -      | -   | -                 | -   | pF   |
| C <sub>PD</sub>   | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub> ; C <sub>EXT</sub> = 0 pF; |                  |        |     |                   |     |      |
|                   |                               | R <sub>EXT</sub> = 5 kΩ                                            |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 1.8 V                                            | -                | 35     | -   | -                 | -   | pF   |
|                   |                               | V <sub>CC</sub> = 2.5 V                                            | -                | 35     | -   | -                 | -   | pF   |
|                   |                               | R <sub>EXT</sub> = 1 kΩ                                            |                  |        |     |                   |     |      |
|                   |                               | V <sub>CC</sub> = 3.3 V                                            | -                | 27     | -   | -                 | -   | pF   |
|                   |                               | V <sub>CC</sub> = 5.0 V                                            | -                | 29     | -   | -                 | -   | pF   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 3.3 V and 5.0 V respectively.

[2] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>

[3] For other R<sub>EXT</sub> and C<sub>EXT</sub> combinations see Fig. 10, Fig. 11 and Fig. 12. If C<sub>EXT</sub> > 10 nF, the next formula is valid.

t<sub>W</sub> = K x R<sub>EXT</sub> x C<sub>EXT</sub>, where:

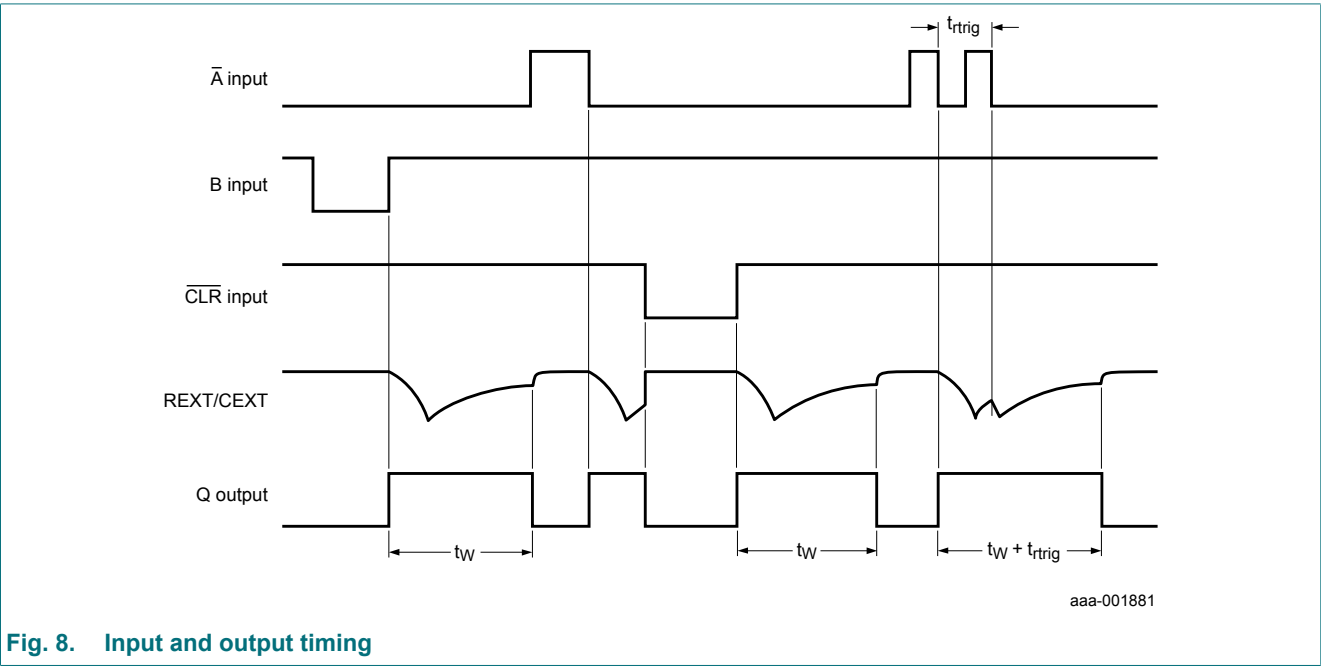
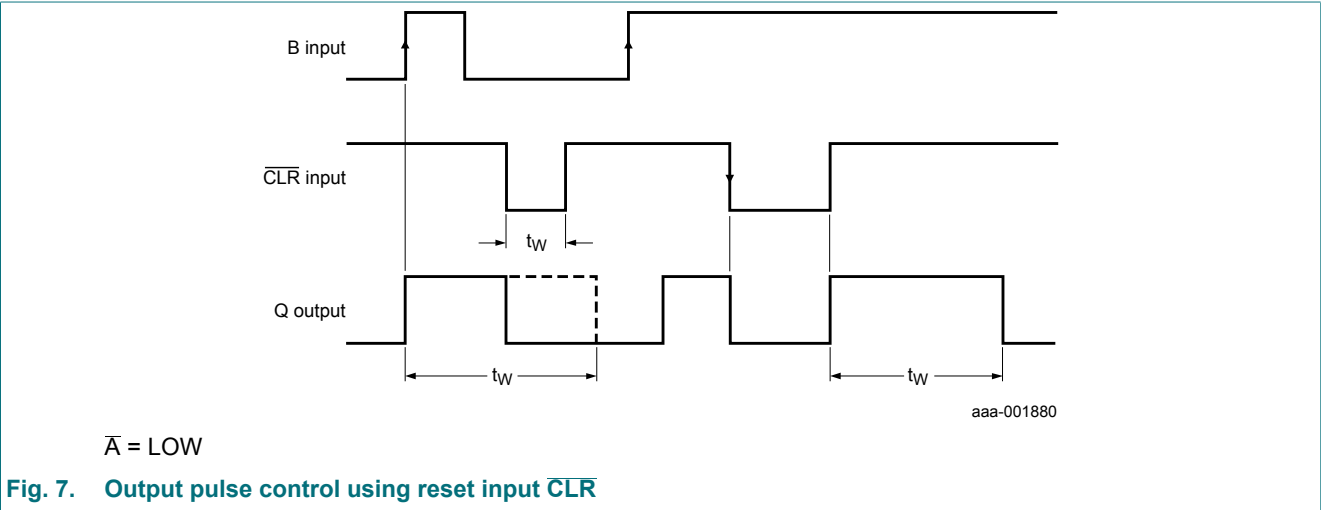
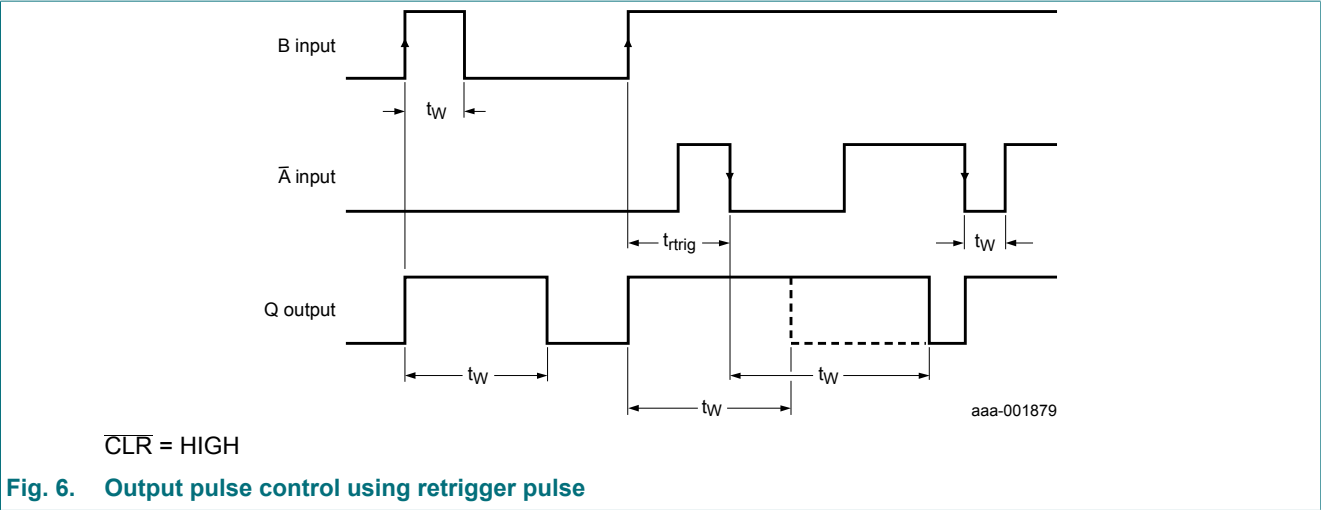
t<sub>W</sub> = typical output pulse width in ns;

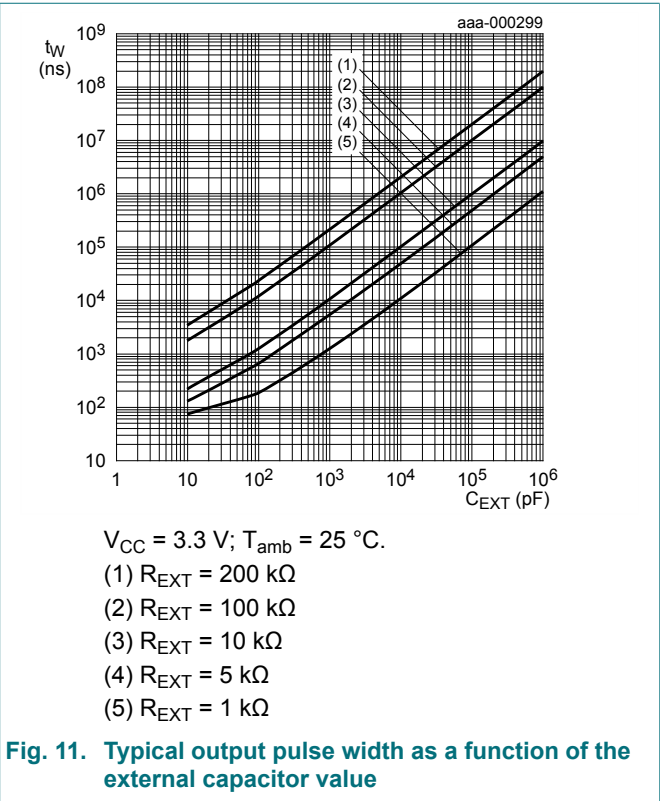
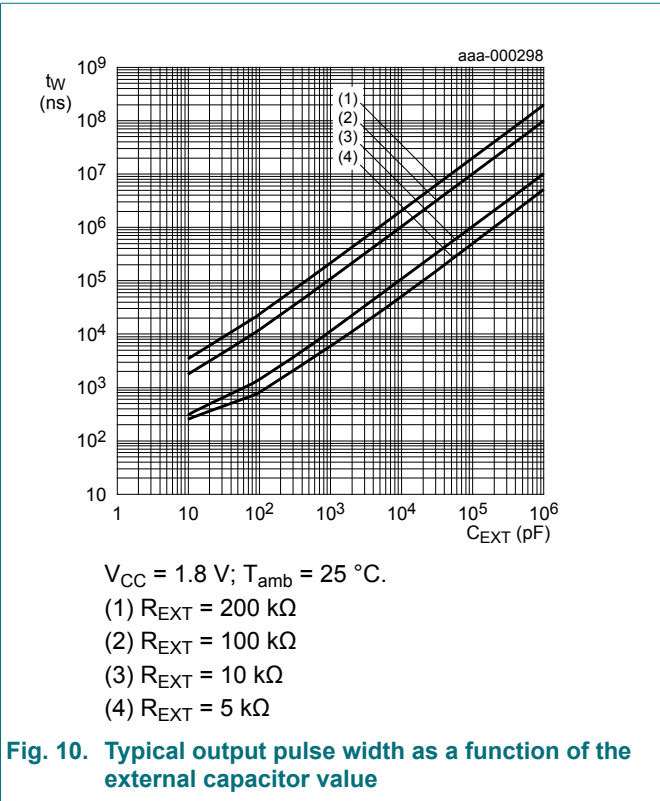
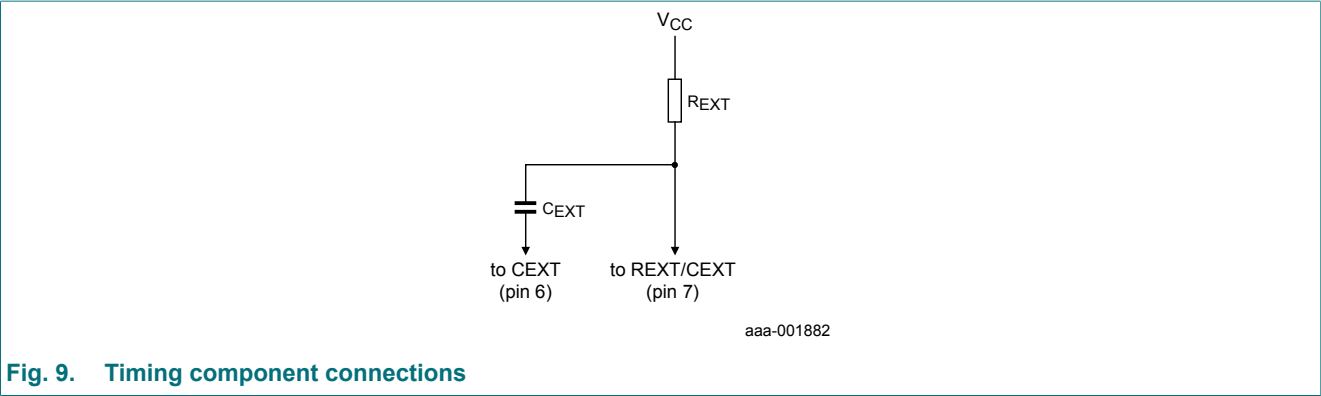
R<sub>EXT</sub> = external resistor in kΩ;

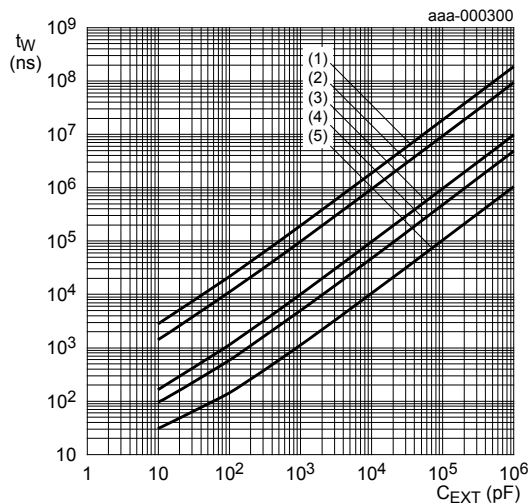
C<sub>EXT</sub> = external capacitor in pF;

K = constant = 1; see Fig. 13 for typical "K" factor as function of V<sub>CC</sub>.





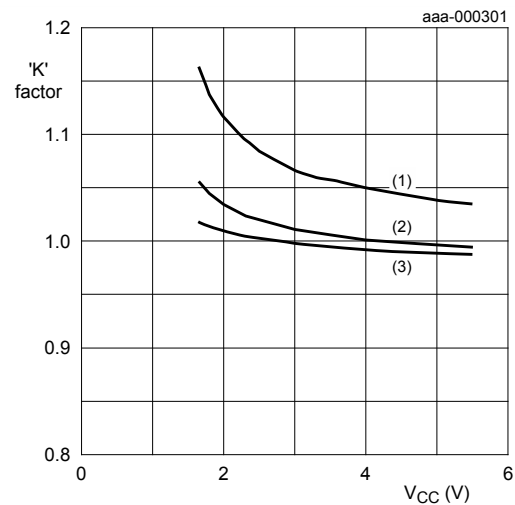




$V_{CC} = 5.0 \text{ V}$ ;  $T_{amb} = 25^\circ\text{C}$ .

- (1)  $R_{EXT} = 200 \text{ k}\Omega$
- (2)  $R_{EXT} = 100 \text{ k}\Omega$
- (3)  $R_{EXT} = 10 \text{ k}\Omega$
- (4)  $R_{EXT} = 5 \text{ k}\Omega$
- (5)  $R_{EXT} = 1 \text{ k}\Omega$

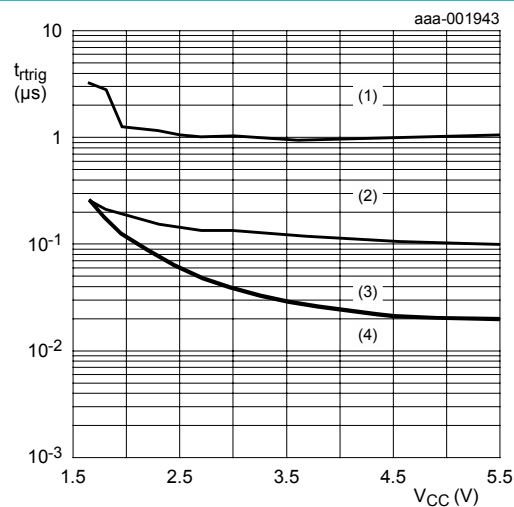
**Fig. 12.** Typical output pulse width as a function of the external capacitor value



$R_{EXT} = 10 \text{ k}\Omega$ ;  $T_{amb} = 25^\circ\text{C}$ .

- (1)  $C_{EXT} = 1000 \text{ pF}$
- (2)  $C_{EXT} = 0.01 \mu\text{F}$
- (3)  $C_{EXT} = 0.1 \mu\text{F}$

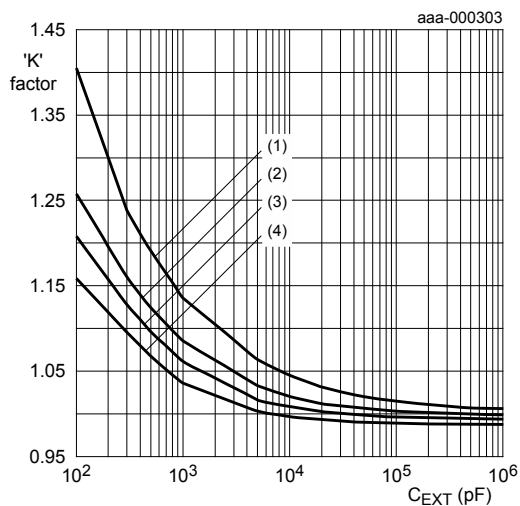
**Fig. 13.** Typical 'K' factor as function of  $V_{CC}$



$T_{amb} = 25^\circ\text{C}$ .

- (1)  $C_{EXT} = 0.01 \mu\text{F}$
- (2)  $C_{EXT} = 1000 \text{ pF}$
- (3)  $C_{EXT} = 100 \text{ pF}$
- (4)  $C_{EXT} = 10 \text{ pF}$

**Fig. 14.** Minimum retrigger time as function of the supply voltage



$R_{EXT} = 10 \text{ k}\Omega$ ;  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ .

(1)  $V_{CC} = 1.8 \text{ V}$

(2)  $V_{CC} = 2.5 \text{ V}$

(3)  $V_{CC} = 3.3 \text{ V}$

(4)  $V_{CC} = 5.0 \text{ V}$

**Fig. 15.** Typical 'K' factor as function of  $C_{EXT}$

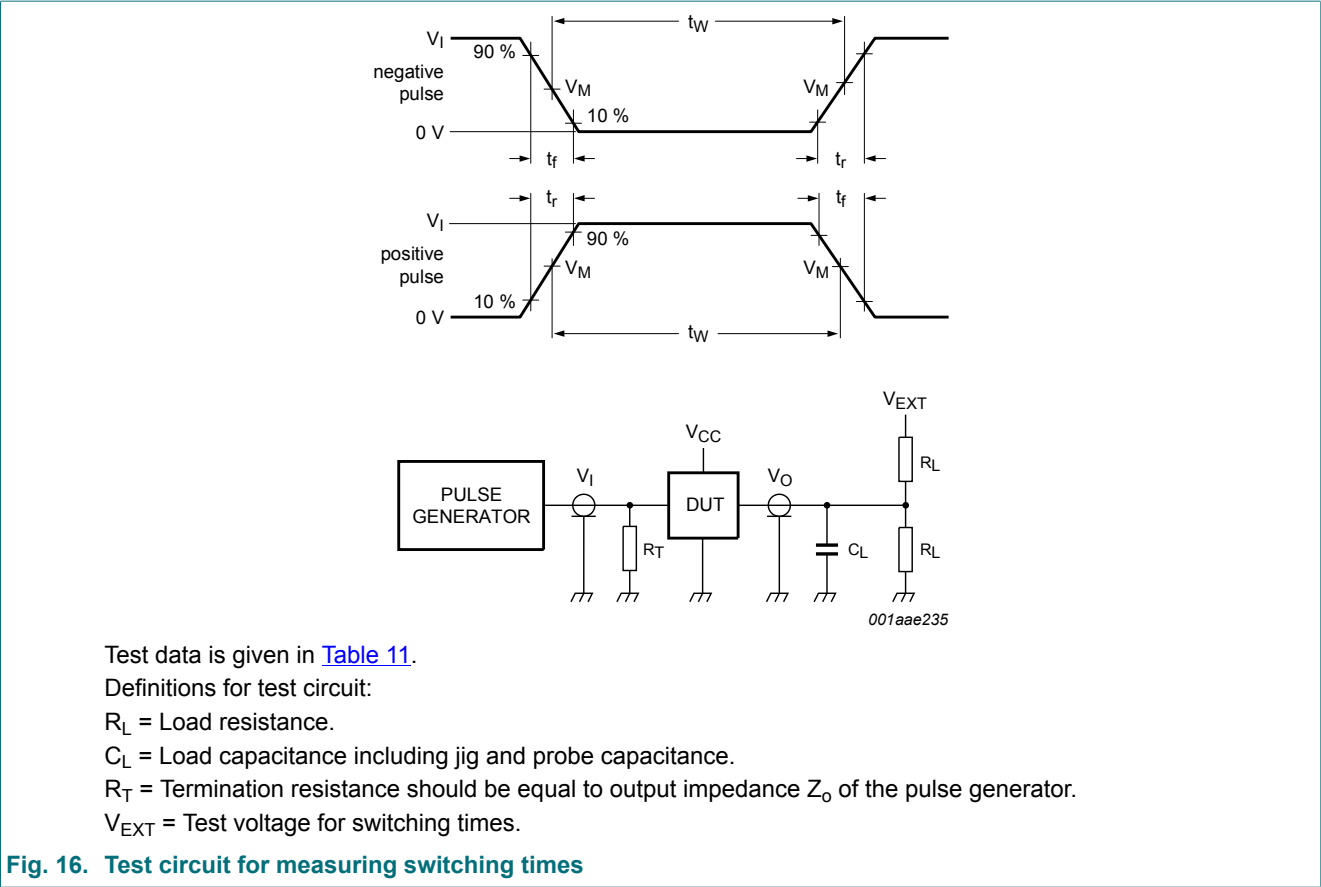
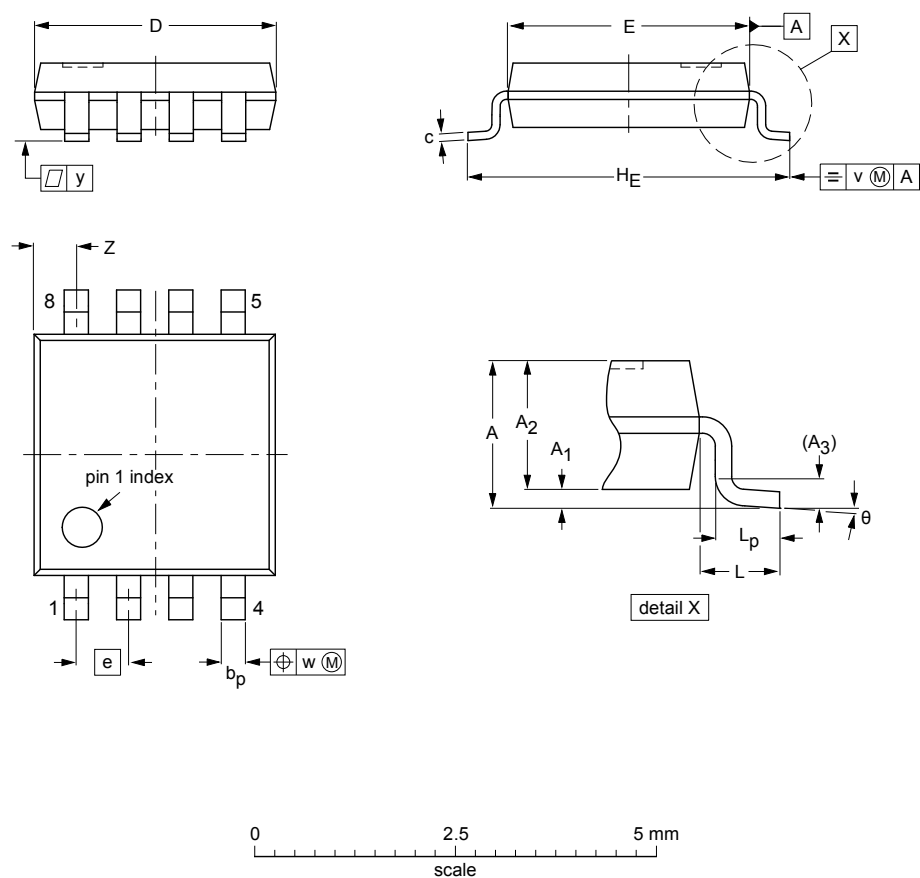


Table 11. Test data

| Supply voltage   | 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 | $V_{CC}$ | $\leq 2.0$ ns | 15 pF | 1 M $\Omega$ | open               |
| 2.3 V to 2.7 V   | $V_{CC}$ | $\leq 2.0$ ns | 15 pF | 1 M $\Omega$ | open               |
| 2.7 V            | 2.7 V    | $\leq 2.5$ ns | 15 pF | 1 M $\Omega$ | open               |
| 3.0 V to 3.6 V   | 2.7 V    | $\leq 2.5$ ns | 15 pF | 1 M $\Omega$ | open               |
| 4.5 V to 5.5 V   | $V_{CC}$ | $\leq 2.5$ ns | 15 pF | 1 M $\Omega$ | open               |
| 1.65 V to 1.95 V | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 1 k $\Omega$ | open               |
| 2.3 V to 2.7 V   | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 500 $\Omega$ | open               |
| 2.7 V            | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               |
| 3.0 V to 3.6 V   | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               |
| 4.5 V to 5.5 V   | $V_{CC}$ | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               |

12. Package outline

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



DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c            | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L   | L <sub>p</sub> | v   | w    | y   | Z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|-----|----------------|-----|------|-----|------------------|----------|
| mm   | 1.1       | 0.15<br>0.00   | 0.95<br>0.75   | 0.25           | 0.38<br>0.22   | 0.18<br>0.08 | 3.1<br>2.9       | 3.1<br>2.9       | 0.65 | 4.1<br>3.9     | 0.5 | 0.47<br>0.33   | 0.2 | 0.13 | 0.1 | 0.70<br>0.35     | 8°<br>0° |

Note

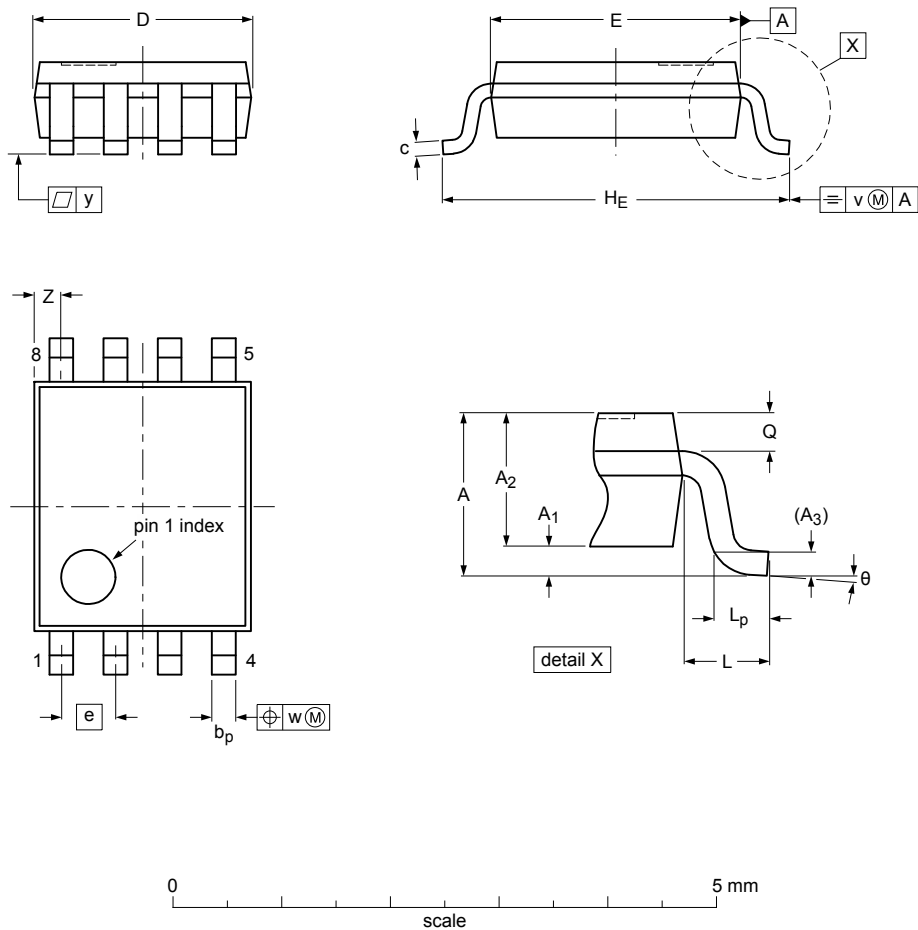
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|------------|
|                    | IEC        | JEDEC | JEITA |  |                                                                                       |            |
| SOT505-2           |            | ---   |       |  |  | 02-01-16   |

Fig. 17. Package outline SOT505-2 (TSSOP8)

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

SOT765-1



Dimensions (mm are the original dimensions)

| Unit | A <sub>max.</sub> | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c    | D <sup>(1)</sup> | E <sup>(2)</sup> | e   | H <sub>E</sub> | L   | L <sub>p</sub> | Q    | v   | w    | y   | Z <sup>(1)</sup> | θ  |
|------|-------------------|----------------|----------------|----------------|----------------|------|------------------|------------------|-----|----------------|-----|----------------|------|-----|------|-----|------------------|----|
| max  |                   | 0.15           | 0.85           |                | 0.27           | 0.23 | 2.1              | 2.4              |     | 3.2            |     | 0.40           | 0.21 |     |      |     | 0.4              | 8° |
| mm   | nom               | 1              |                | 0.12           |                |      |                  |                  | 0.5 |                | 0.4 |                |      | 0.2 | 0.08 | 0.1 |                  |    |
| min  |                   |                | 0.60           |                | 0.17           | 0.08 | 1.9              | 2.2              |     | 3.0            |     | 0.15           | 0.19 |     |      |     | 0.1              | 0° |

Note

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

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

sot765-1\_po

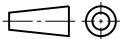
| Outline version | References |        |       |  | European projection                                                                   | Issue date             |
|-----------------|------------|--------|-------|--|---------------------------------------------------------------------------------------|------------------------|
|                 | IEC        | JEDEC  | JEITA |  |                                                                                       |                        |
| SOT765-1        |            | MO-187 |       |  |  | -07-06-02-<br>16-05-31 |

Fig. 18. Package outline SOT765-1 (VSSOP8)

## 13. Abbreviations

Table 12. Abbreviations

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

## 14. Revision history

Table 13. Revision history

| Document ID         | Release date                                                                                                                                                                                                                           | Data sheet status  | Change notice | Supersedes          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|---------------------|
| 74LVC1G123_Q100 v.3 | 20181102                                                                                                                                                                                                                               | Product data sheet | -             | 74LVC1G123_Q100 v.2 |
| Modifications:      | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul> |                    |               |                     |
| 74LVC1G123_Q100 v.2 | 20160613                                                                                                                                                                                                                               | Product data sheet | -             | 74LVC1G123_Q100 v.1 |
| Modifications:      | <ul style="list-style-type: none"><li><a href="#">Fig. 18</a>, package outline drawing for SOT765-1 has changed</li></ul>                                                                                                              |                    |               |                     |
| 74LVC1G123_Q100 v.1 | 20140310                                                                                                                                                                                                                               | Product data sheet | -             | -                   |

## 15. Legal information

### Data sheet status

| Document status<br>[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 <https://www.nexperia.com>.

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