

## Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of <http://www.nxp.com>, <http://www.philips.com/> or <http://www.semiconductors.philips.com/>, use **<http://www.nexperia.com>**

Instead of [sales.addresses@www.nxp.com](mailto:sales.addresses@www.nxp.com) or [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com), use **[salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)** (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:

- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved

Should be replaced with:

- © **Nexperia B.V. (year). All rights reserved.**

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via **[salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)**). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

# 74LVC1G123

Single retriggerable monostable multivibrator; Schmitt trigger inputs

Rev. 5 — 14 June 2016

Product data sheet

## 1. General description

The 74LVC1G123 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.

## 2. Features and benefits

- 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:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

### 3. Ordering information

Table 1. Ordering information

| Type number  | Package                                                         |        |                                                                                                                |          |
|--------------|-----------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------|----------|
|              | Temperature range                                               | Name   | Description                                                                                                    | Version  |
| 74LVC1G123DP | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm                        | SOT505-2 |
| 74LVC1G123DC | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm                                     | SOT765-1 |
| 74LVC1G123GT | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | XSON8  | plastic extremely thin small outline package; no leads; 8 terminals; body $1 \times 1.95 \times 0.5\text{ mm}$ | SOT833-1 |
| 74LVC1G123GF | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | XSON8  | extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1 \times 0.5\text{ mm}$         | SOT1089  |
| 74LVC1G123GD | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | XSON8  | plastic extremely thin small outline package; no leads; 8 terminals; body $3 \times 2 \times 0.5\text{ mm}$    | SOT996-2 |
| 74LVC1G123GN | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | XSON8  | extremely thin small outline package; no leads; 8 terminals; body $1.2 \times 1.0 \times 0.35\text{ mm}$       | SOT1116  |
| 74LVC1G123GS | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | XSON8  | extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1.0 \times 0.35\text{ mm}$      | SOT1203  |

### 4. Marking

Table 2. Marking codes

| Type number  | Marking code <sup>[1]</sup> |
|--------------|-----------------------------|
| 74LVC1G123DP | Y3                          |
| 74LVC1G123DC | Y3                          |
| 74LVC1G123GT | Y3                          |
| 74LVC1G123GF | Y3                          |
| 74LVC1G123GD | Y3                          |
| 74LVC1G123GN | Y3                          |
| 74LVC1G123GS | Y3                          |

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

## 5. Functional diagram

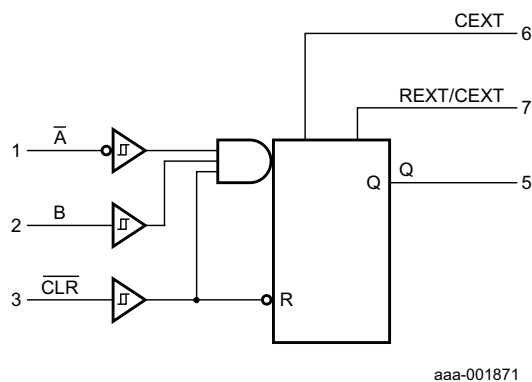


Fig 1. Logic symbol

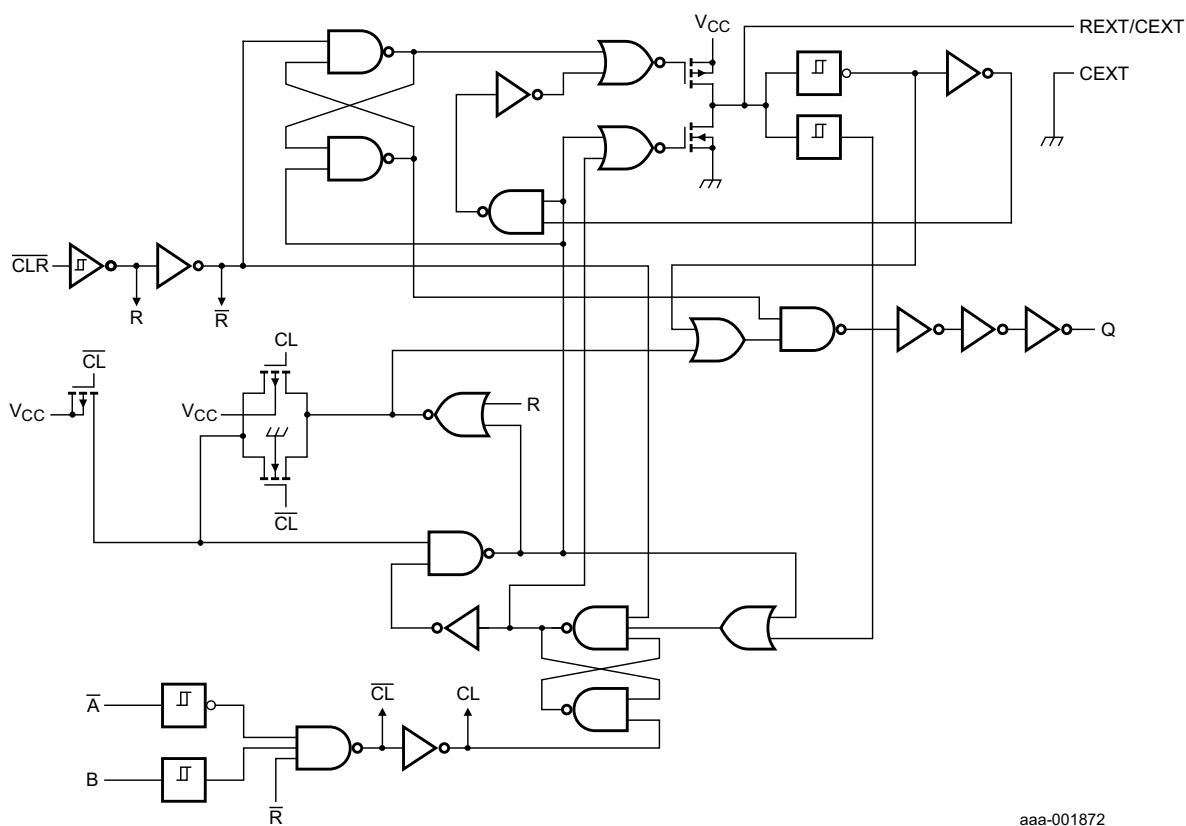
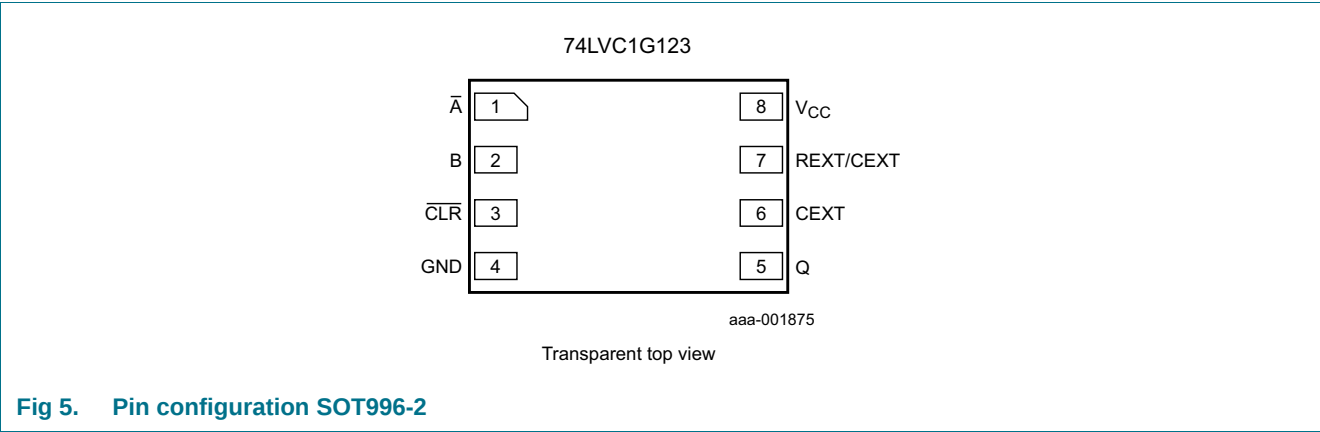
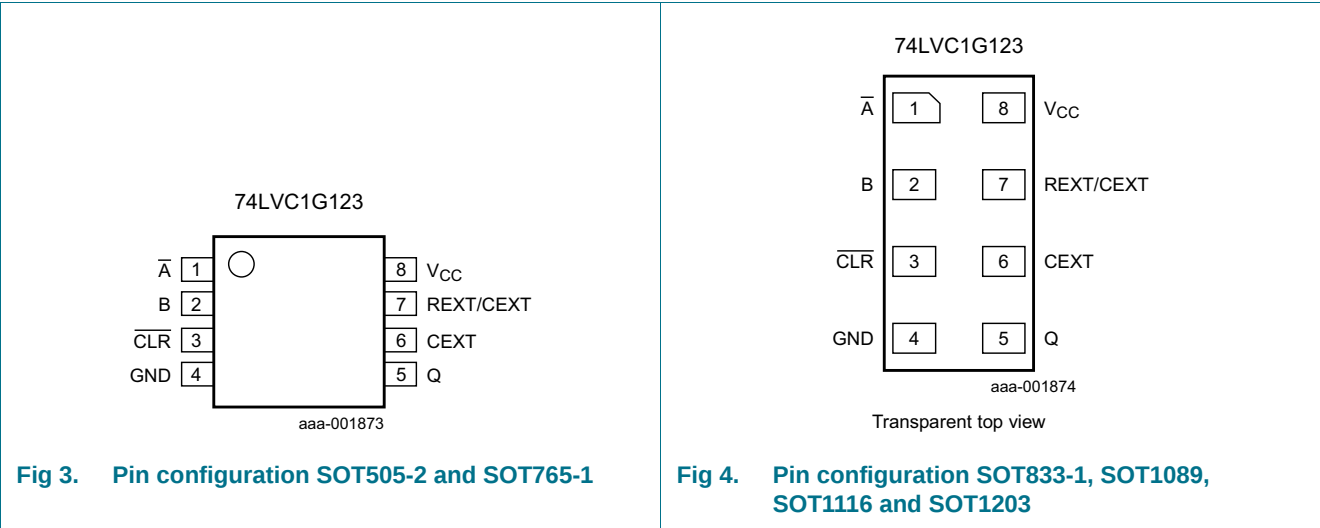


Fig 2. Logic diagram

6. Pinning information

6.1 Pinning



## 6.2 Pin description

Table 3. Pin description

| Symbol           | Pin | Description                                        |
|------------------|-----|----------------------------------------------------|
| $\overline{A}$   | 1   | negative-edge triggered input                      |
| B                | 2   | positive-edge triggered input                      |
| $\overline{CLR}$ | 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<sup>[1]</sup>

| Input |                |   | Output                                                                                |
|-------|----------------|---|---------------------------------------------------------------------------------------|
| CLR   | $\overline{A}$ | B | Q                                                                                     |
| L     | X              | X | L                                                                                     |
| X     | H              | X | L <sup>[2]</sup>                                                                      |
| X     | X              | L | L <sup>[2]</sup>                                                                      |
| H     | L              | ↑ |  |
| H     | ↓              | H |  |
| ↑     | L              | H |  |

[1] 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;  = one LOW level output pulse.

[2] 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 |
|-----------|-------------------------|-------------------------------|------|----------------|------|
| $V_{CC}$  | supply voltage          |                               | -0.5 | +6.5           | V    |
| $V_I$     | input voltage           |                               | -0.5 | +6.5           | V    |
| $V_O$     | output voltage          | Active mode                   | -0.5 | $V_{CC} + 0.5$ | V    |
|           |                         | Power-down mode               | -0.5 | +6.5           | V    |
| $I_{IK}$  | input clamping current  | $V_I < 0$ V                   | -50  | -              | mA   |
| $I_{OK}$  | output clamping current | $V_O < 0$ V or $V_O > V_{CC}$ | -    | $\pm 50$       | mA   |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$       | -    | $\pm 50$       | mA   |
| $I_{CC}$  | supply current          |                               | -    | 100            | mA   |
| $I_{GND}$ | ground current          |                               | -100 | -              | mA   |
| $T_{stg}$ | storage temperature     |                               | -65  | +150           | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C | -    | 300            | mW   |

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

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

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

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

For XSON8 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. Operating conditions**

| Symbol              | Parameter                           | Conditions                 | Min  | Max      | Unit |
|---------------------|-------------------------------------|----------------------------|------|----------|------|
| $V_{CC}$            | supply voltage                      |                            | 1.65 | 5.5      | V    |
| $V_I$               | input voltage                       |                            | 0    | 5.5      | V    |
| $V_O$               | output voltage                      | Active mode                | 0    | $V_{CC}$ | V    |
|                     |                                     | Power-down mode            | 0    | 5.5      | V    |
| $T_{amb}$           | ambient temperature                 |                            | -40  | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.65$ V to 5.5 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 | Max     | Unit          |
|-----------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------|----------------|-----|---------|---------------|
| $T_{amb} = -40\text{ }^{\circ}\text{C to } +85\text{ }^{\circ}\text{C}$ [1] |                           |                                                                             |                |     |         |               |
| $V_{OH}$                                                                    | HIGH-level output voltage | $V_I = V_{T+}$ 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  | $V_I = V_{T+}$ 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     | $V_I = 5.5\text{ V or GND}$ ; $V_{CC} = 0\text{ V to } 5.5\text{ V}$        | -              | -   | $\pm 2$ | $\mu\text{A}$ |
| $I_{OFF}$                                                                   | power-off leakage current | $V_I$ or $V_O = 5.5\text{ V}$ ; $V_{CC} = 0\text{ V}$                       | -              | -   | $\pm 2$ | $\mu\text{A}$ |
| $I_{CC}$                                                                    | supply current            | $V_I = 5.5\text{ V or GND}$ ;                                               |                |     |         |               |
|                                                                             |                           | Quiescent; $V_{CC} = 1.65\text{ V to } 5.5\text{ V}$ ; $I_O = 0\text{ A}$   | -              | 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            |

**Table 7.** Static characteristics ...continued

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

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

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

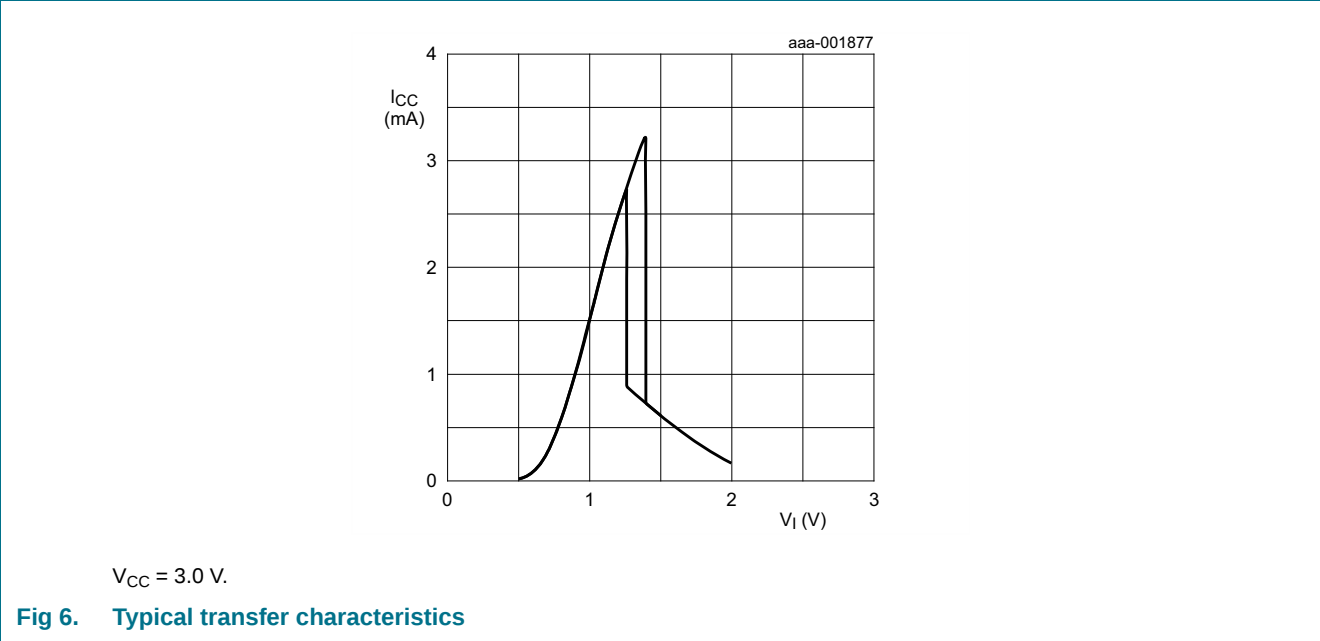
Table 8. Transfer characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

| Symbol          | Parameter                        | Conditions                                                                                                        | −40 °C to +85 °C |                    |      | −40 °C to +125 °C |      | Unit |
|-----------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------|--------------------|------|-------------------|------|------|
|                 |                                  |                                                                                                                   | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| V <sub>T+</sub> | positive-going threshold voltage | $\overline{A}$ , B and $\overline{CLR}$ input; see <a href="#">Figure 6</a>                                       |                  |                    |      |                   |      |      |
|                 |                                  | 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 <a href="#">Figure 6</a>                                       |                  |                    |      |                   |      |      |
|                 |                                  | 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 <a href="#">Figure 6</a> |                  |                    |      |                   |      |      |
|                 |                                  | 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] All typical values are measured at T<sub>amb</sub> = 25 °C

10.1 Waveform transfer characteristics



## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

| Symbol          | Parameter         | Conditions                                                           | −40 °C to +85 °C |                    |      | −40 °C to +125 °C |      | Unit |
|-----------------|-------------------|----------------------------------------------------------------------|------------------|--------------------|------|-------------------|------|------|
|                 |                   |                                                                      | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| t <sub>pd</sub> | propagation delay | $\overline{A}$ , B to Q; see <a href="#">Figure 7</a> <sup>[2]</sup> |                  |                    |      |                   |      |      |
|                 |                   | C <sub>L</sub> = 15 pF;                                              |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                   | 2.5              | 7.1                | 16.3 | 2.5               | 17.6 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                     | 1.9              | -                  | 10.3 | 1.9               | 11.2 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                              | 1.9              | -                  | 8.5  | 1.9               | 9.3  | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | 1.5              | -                  | 7.6  | 1.5               | 8.3  | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | 1.2              | -                  | 5.3  | 1.2               | 5.8  | ns   |
|                 |                   | C <sub>L</sub> = 30 pF or C <sub>L</sub> = 50 pF                     |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                   | 2.9              | 7.8                | 17.6 | 2.9               | 19.0 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                     | 2.2              | -                  | 11.3 | 2.2               | 12.3 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                              | 2.7              | -                  | 10.5 | 2.7               | 11.4 | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | 2.0              | -                  | 9.5  | 2.0               | 10.3 | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | 1.5              | -                  | 6.7  | 1.5               | 7.2  | ns   |
|                 |                   | CLR to Q; see <a href="#">Figure 7</a>                               |                  |                    |      |                   |      |      |
|                 |                   | C <sub>L</sub> = 15 pF;                                              |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                   | 3.0              | 6.9                | 16.2 | 3.0               | 17.4 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                     | 2.2              | -                  | 9.6  | 2.2               | 10.5 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                              | 2.2              | -                  | 8.2  | 2.2               | 8.9  | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | 2.0              | -                  | 7.3  | 2.0               | 8.0  | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | 1.5              | -                  | 5.1  | 1.5               | 5.5  | ns   |
|                 |                   | C <sub>L</sub> = 30 pF or C <sub>L</sub> = 50 pF                     |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                   | 3.3              | 7.5                | 17.2 | 3.8               | 18.6 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                     | 2.5              | -                  | 10.3 | 2.0               | 11.2 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                              | 2.8              | -                  | 9.3  | 2.8               | 10.2 | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | 1.5              | -                  | 8.4  | 1.5               | 9.2  | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | 1.5              | -                  | 6.0  | 1.5               | 6.6  | ns   |

**Table 9.** Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

| Symbol          | Parameter         | Conditions                                                                                     | –40 °C to +85 °C |                    |      | –40 °C to +125 °C |      | Unit |
|-----------------|-------------------|------------------------------------------------------------------------------------------------|------------------|--------------------|------|-------------------|------|------|
|                 |                   |                                                                                                | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| t <sub>pd</sub> | propagation delay | CLR to Q (trigger); see <a href="#">Figure 7</a>                                               |                  |                    |      |                   |      |      |
|                 |                   | C <sub>L</sub> = 15 pF;                                                                        |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                                             | 2.7              | 7.6                | 17.4 | 2.7               | 18.9 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                                               | 2.1              | -                  | 11.0 | 2.1               | 12.0 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                                                        | 2.1              | -                  | 9.2  | 2.1               | 10.0 | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                                               | 1.7              | -                  | 8.2  | 1.7               | 8.9  | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                               | 1.4              | -                  | 5.9  | 1.4               | 6.4  | ns   |
|                 |                   | C <sub>L</sub> = 30 pF or C <sub>L</sub> = 50 pF                                               |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                                             | 3.1              | 8.3                | 18.8 | 3.3               | 20.3 | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                                               | 2.5              | -                  | 12.0 | 2.5               | 13.1 | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                                                        | 2.8              | -                  | 11.1 | 2.8               | 12.1 | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                                               | 2.0              | -                  | 10.1 | 2.0               | 11.0 | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                               | 1.5              | -                  | 7.1  | 1.5               | 7.7  | ns   |
| t <sub>w</sub>  | pulse width       | input $\overline{A}$ LOW; B HIGH;<br>see <a href="#">Figure 7</a> and <a href="#">Figure 8</a> |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                                             | 8.0              | -                  | -    | 8.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                                               | 4.0              | -                  | -    | 4.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                                                        | 3.0              | -                  | -    | 3.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                                               | 3.0              | -                  | -    | 3.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                               | 2.5              | -                  | -    | 2.5               | -    | ns   |
|                 |                   | input $\overline{CLR}$ LOW;<br>see <a href="#">Figure 7</a> and <a href="#">Figure 9</a>       |                  |                    |      |                   |      |      |
|                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                                             | 8.0              | -                  | -    | 8.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                                               | 4.0              | -                  | -    | 4.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 2.7 V                                                                        | 3.0              | -                  | -    | 3.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                                               | 3.0              | -                  | -    | 3.0               | -    | ns   |
|                 |                   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                               | 2.5              | -                  | -    | 2.5               | -    | ns   |

**Table 9.** Dynamic characteristics ...continuedVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

| Symbol             | Parameter            | Conditions                                                                                                                           | –40 °C to +85 °C |                    |      | –40 °C to +125 °C |      | Unit |
|--------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------|------|-------------------|------|------|
|                    |                      |                                                                                                                                      | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| t <sub>w</sub>     | pulse width          | output Q HIGH;<br>see <a href="#">Figure 7</a> , <a href="#">Figure 8</a> and <a href="#">Figure 9</a> ;<br>R <sub>EXT</sub> = 10 kΩ |                  |                    |      |                   |      |      |
|                    |                      | C <sub>EXT</sub> = 100 pF                                                                                                            |                  |                    |      |                   |      |      |
|                    |                      | V <sub>CC</sub> = 1.65 V to 1.95 V                                                                                                   | -                | 1.4                | 2.2  | -                 | 2.2  | μs   |
|                    |                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                     | -                | 1.3                | 1.8  | -                 | 1.8  | μs   |
|                    |                      | V <sub>CC</sub> = 2.7 V                                                                                                              | -                | 1.2                | 1.8  | -                 | 1.8  | μs   |
|                    |                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                     | -                | 1.2                | 1.8  | -                 | 1.8  | μs   |
|                    |                      | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                     | -                | 1.2                | 1.8  | -                 | 1.8  | μs   |
|                    |                      | C <sub>EXT</sub> = 0.01 μF                                                                                                           |                  |                    |      |                   |      |      |
|                    |                      | V <sub>CC</sub> = 1.65 V to 1.95 V                                                                                                   | -                | 100                | 110  | -                 | 110  | μs   |
|                    |                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                     | -                | 100                | 110  | -                 | 110  | μs   |
|                    |                      | V <sub>CC</sub> = 2.7 V                                                                                                              | -                | 100                | 110  | -                 | 110  | μs   |
|                    |                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                     | -                | 100                | 110  | -                 | 110  | μs   |
|                    |                      | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                     | -                | 100                | 110  | -                 | 110  | μs   |
|                    |                      | C <sub>EXT</sub> = 0.1 μF                                                                                                            |                  |                    |      |                   |      |      |
|                    |                      | V <sub>CC</sub> = 1.65 V to 1.95 V                                                                                                   | -                | 1.0                | 1.05 | -                 | 1.05 | ms   |
|                    |                      | V <sub>CC</sub> = 2.7 V                                                                                                              | -                | 1.0                | 1.05 | -                 | 1.05 | ms   |
|                    |                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                     | -                | 1.0                | 1.05 | -                 | 1.05 | ms   |
|                    |                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                     | -                | 1.0                | 1.05 | -                 | 1.05 | ms   |
|                    |                      | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                     | -                | 1.0                | 1.05 | -                 | 1.05 | ms   |
| t <sub>rtrig</sub> | retrigger time       | A, B; see <a href="#">Figure 8</a>                                                                                                   |                  |                    |      |                   |      |      |
|                    |                      | 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 <a href="#">Figure 12</a> , <a href="#">Figure 13</a> and <a href="#">Figure 14</a>                                              |                  |                    |      |                   |      |      |
|                    |                      | 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;<br>see <a href="#">Figure 12</a> , <a href="#">Figure 13</a> and <a href="#">Figure 14</a>                  | -                | -                  | -    | -                 | -    | pF   |

**Table 9. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 18](#).

| Symbol          | Parameter                     | Conditions                                                         | –40 °C to +85 °C |                    |     | –40 °C to +125 °C |     | Unit |
|-----------------|-------------------------------|--------------------------------------------------------------------|------------------|--------------------|-----|-------------------|-----|------|
|                 |                               |                                                                    | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| 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>; t<sub>I</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>

[3] For other R<sub>EXT</sub> and C<sub>EXT</sub> combinations see [Figure 12](#), [Figure 13](#) and [Figure 14](#). If C<sub>EXT</sub> > 10 nF, the next formula is valid.

t<sub>W</sub> = K × R<sub>EXT</sub> × 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 [Figure 15](#) for typical "K" factor as function of V<sub>CC</sub>.

12. Waveforms, graphs and test circuit

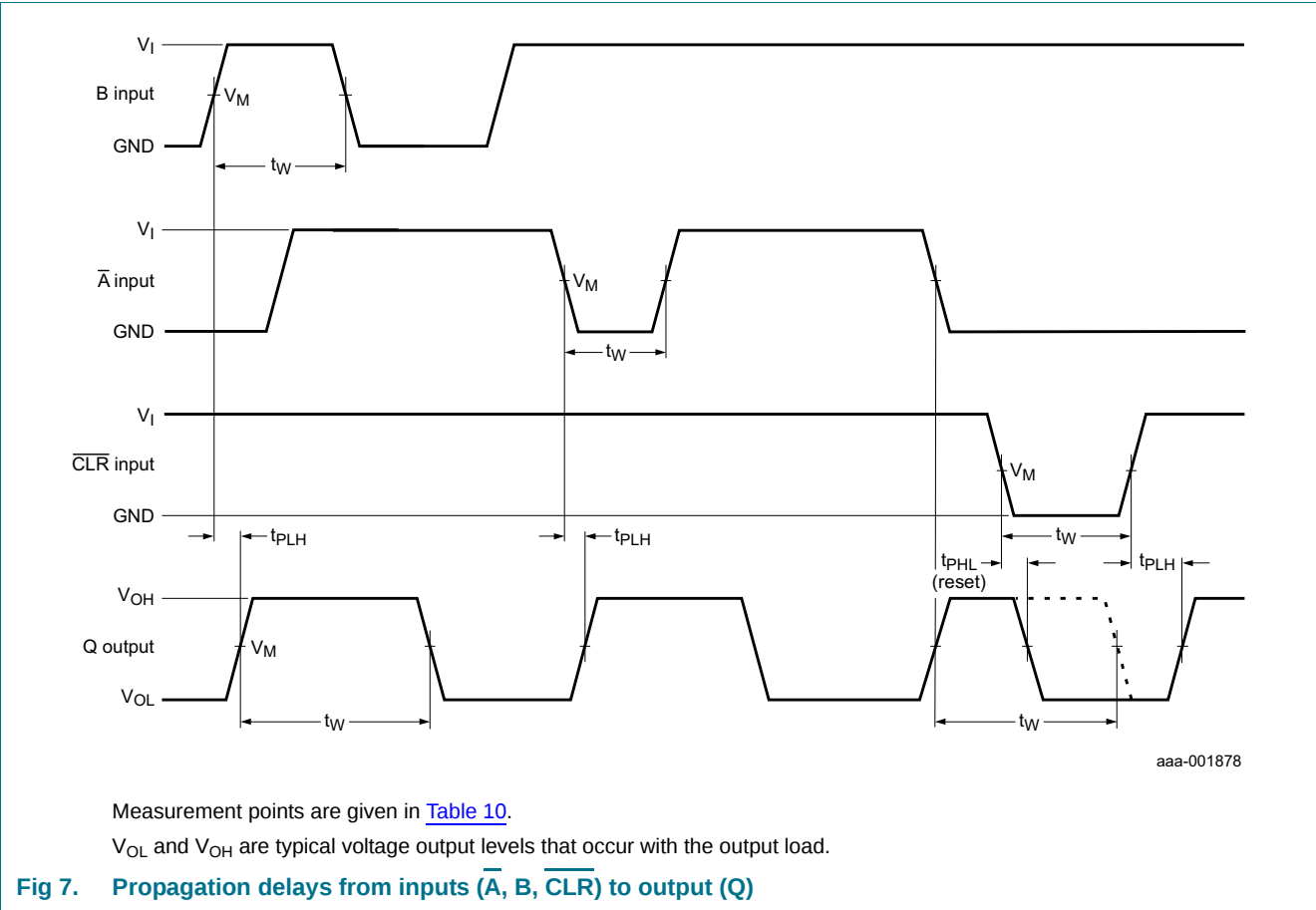
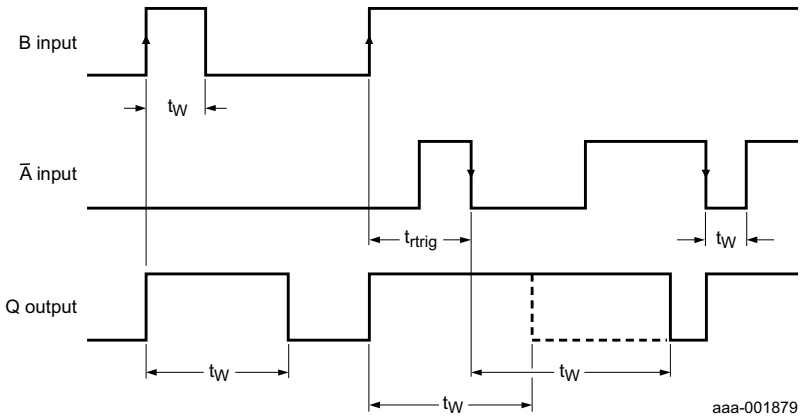


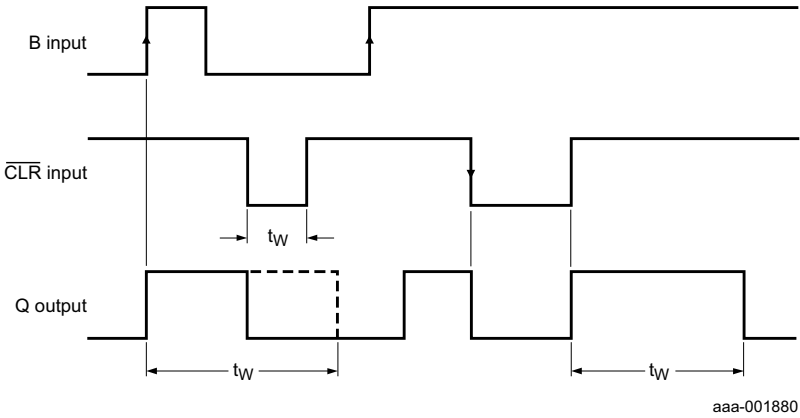
Table 10. Measurement points

| Supply voltage   | Input       | Output      |
|------------------|-------------|-------------|
| $V_{CC}$         | $V_M$       | $V_M$       |
| 1.65 V to 1.95 V | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 2.3 V to 2.7 V   | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 2.7 V            | 1.5 V       | 1.5 V       |
| 3.0 V to 3.6 V   | 1.5 V       | 1.5 V       |
| 4.5 V to 5.5 V   | $0.5V_{CC}$ | $0.5V_{CC}$ |



$\overline{\text{CLR}} = \text{HIGH}$

Fig 8. Output pulse control using retrigger pulse



$\overline{\text{A}} = \text{LOW}$

Fig 9. Output pulse control using reset input  $\overline{\text{CLR}}$

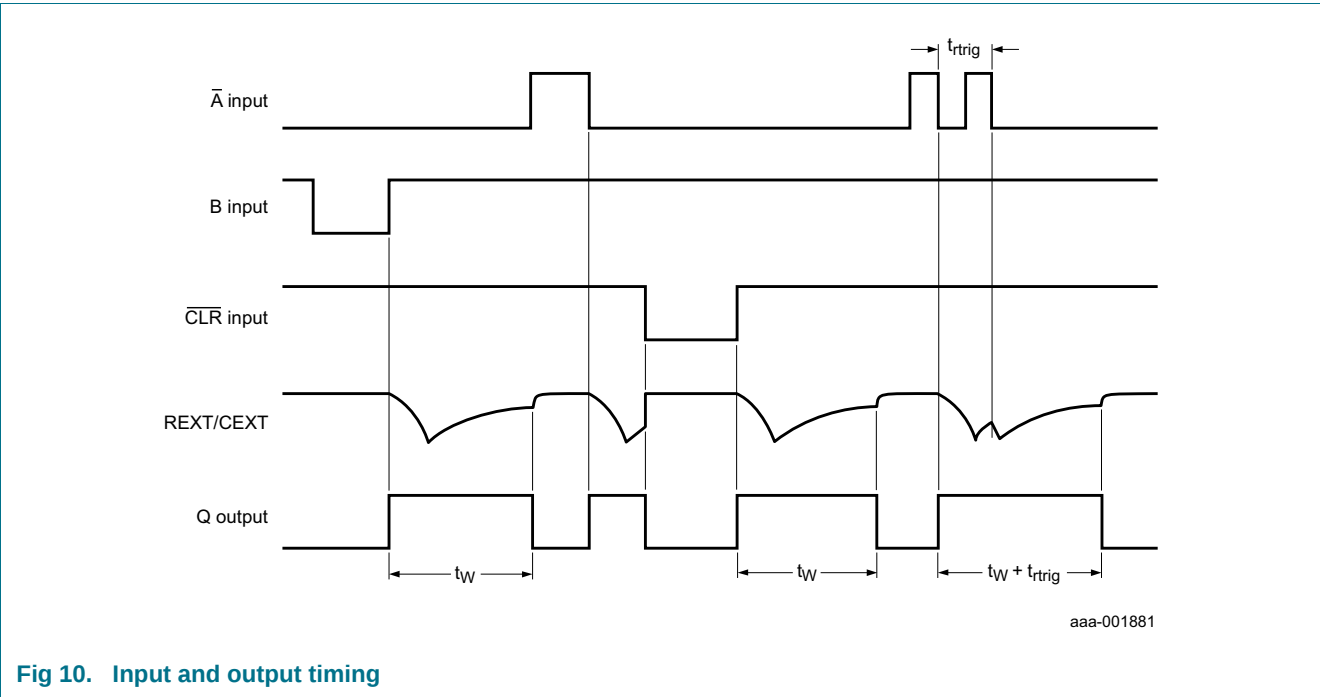


Fig 10. Input and output timing

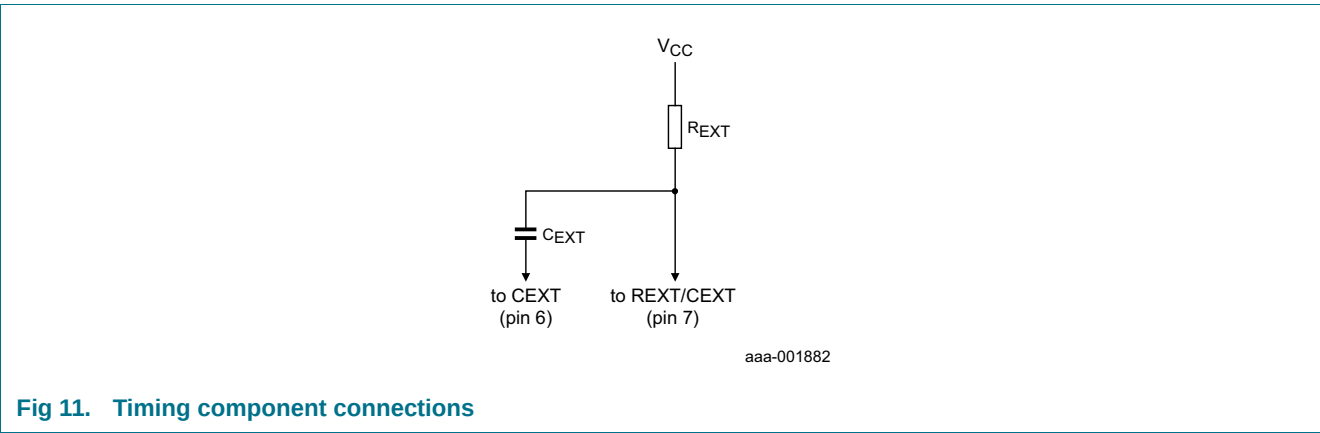
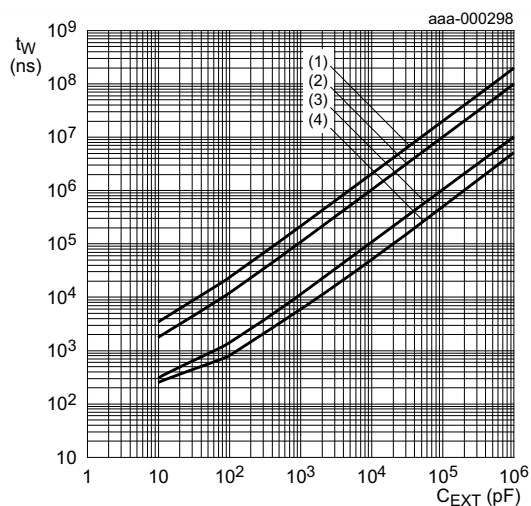


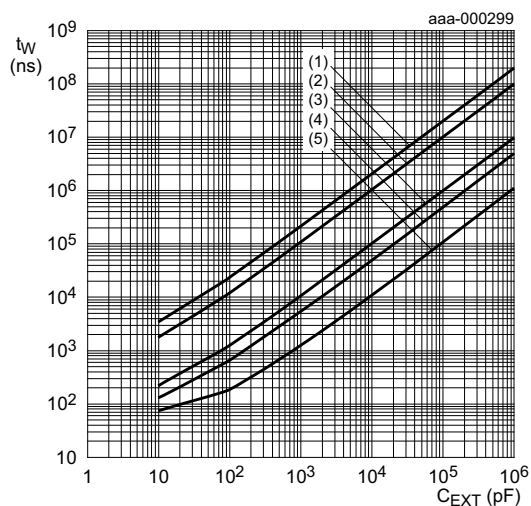
Fig 11. Timing component connections



$V_{CC} = 1.8 \text{ V}$ ;  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ .

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

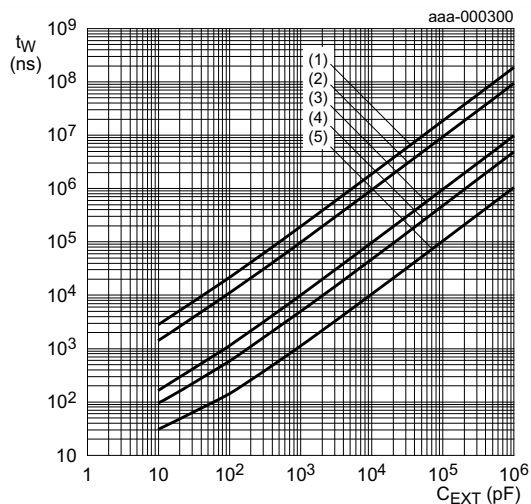
**Fig 12. Typical output pulse width as a function of the external capacitor value**



$V_{CC} = 3.3 \text{ V}$ ;  $T_{amb} = 25 \text{ }^{\circ}\text{C}$ .

- (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)  $R_{EXT} = 1 \text{ k}\Omega$

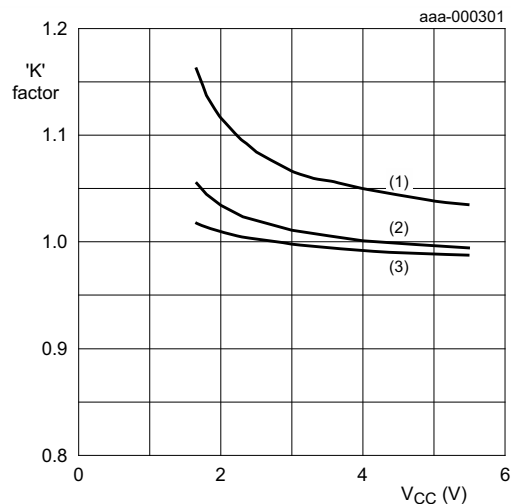
**Fig 13. Typical output pulse width as a function of the external capacitor value**



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

- (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)  $R_{EXT} = 1 \text{ k}\Omega$

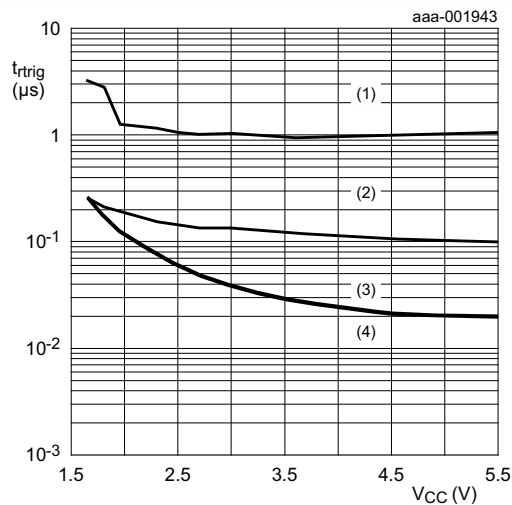
**Fig 14. Typical output pulse width as a function of the external capacitor value**



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

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

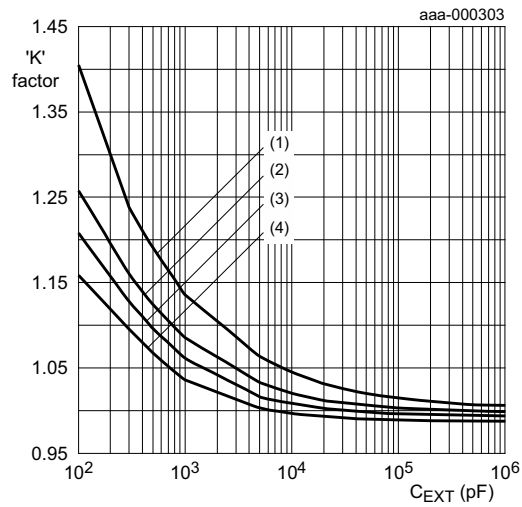
**Fig 15. Typical 'K' factor as function of  $V_{CC}$**



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

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

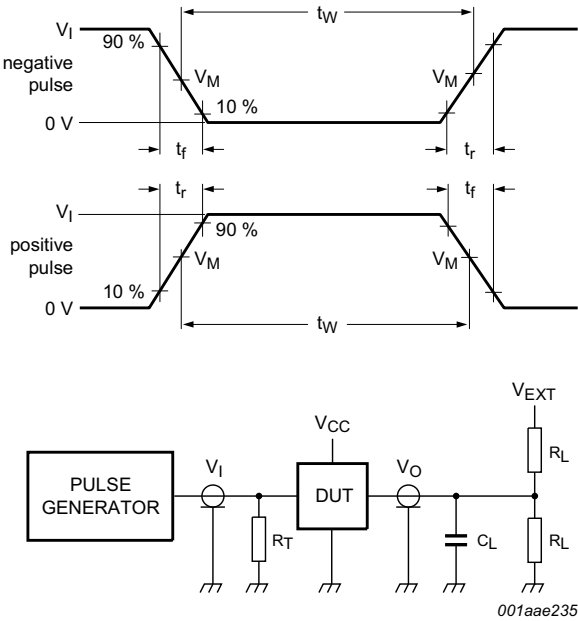
**Fig 16. Minimum retrigger time as function of the supply voltage**



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

- (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 17. Typical 'K' factor as function of  $C_{EXT}$**



Test data is given in [Table 11](#).  
Definitions for test circuit:  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.  
 $V_{EXT}$  = Test voltage for switching times.

Fig 18. Test circuit for measuring switching times

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               |

13. Package outline

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

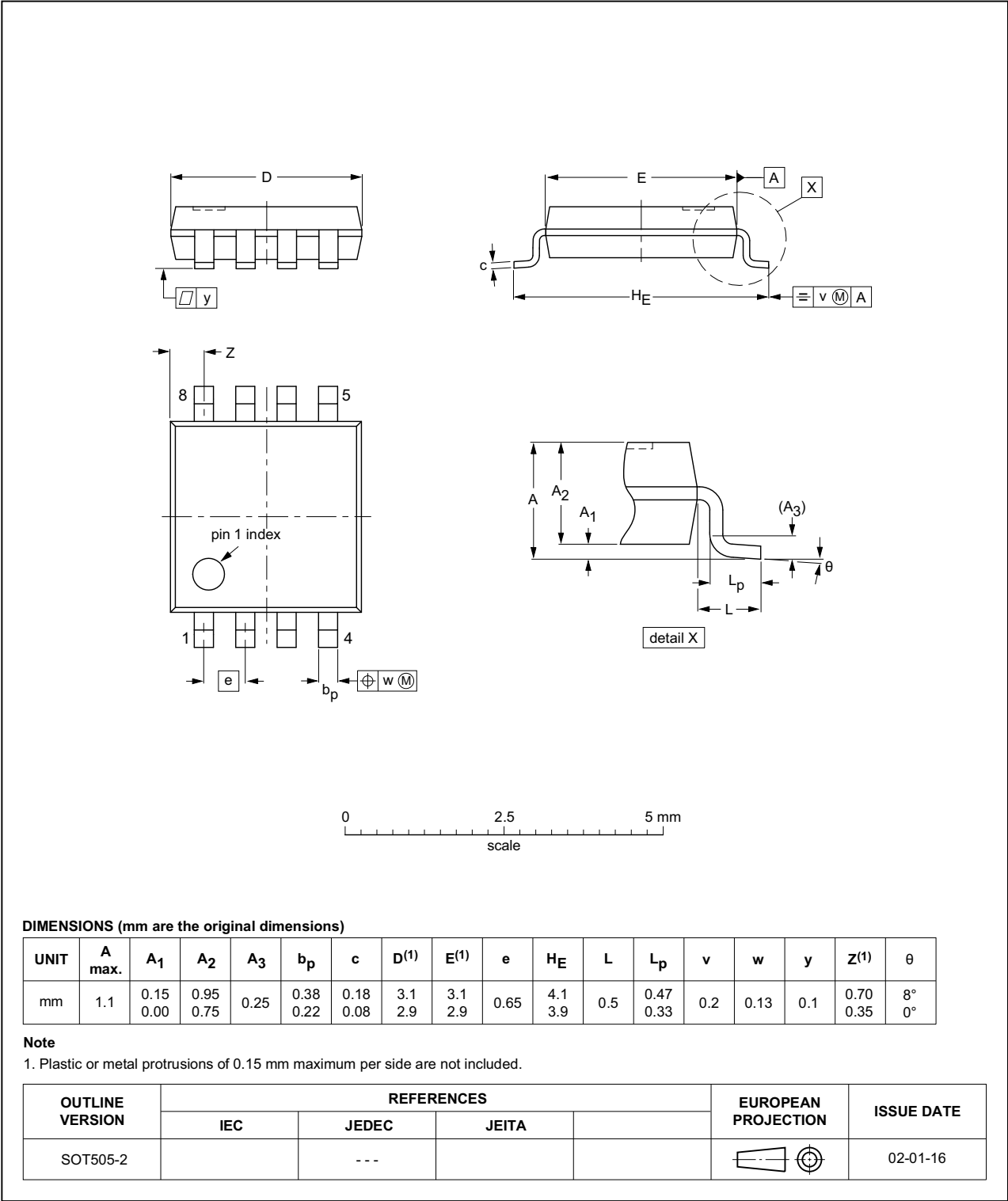


Fig 19. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

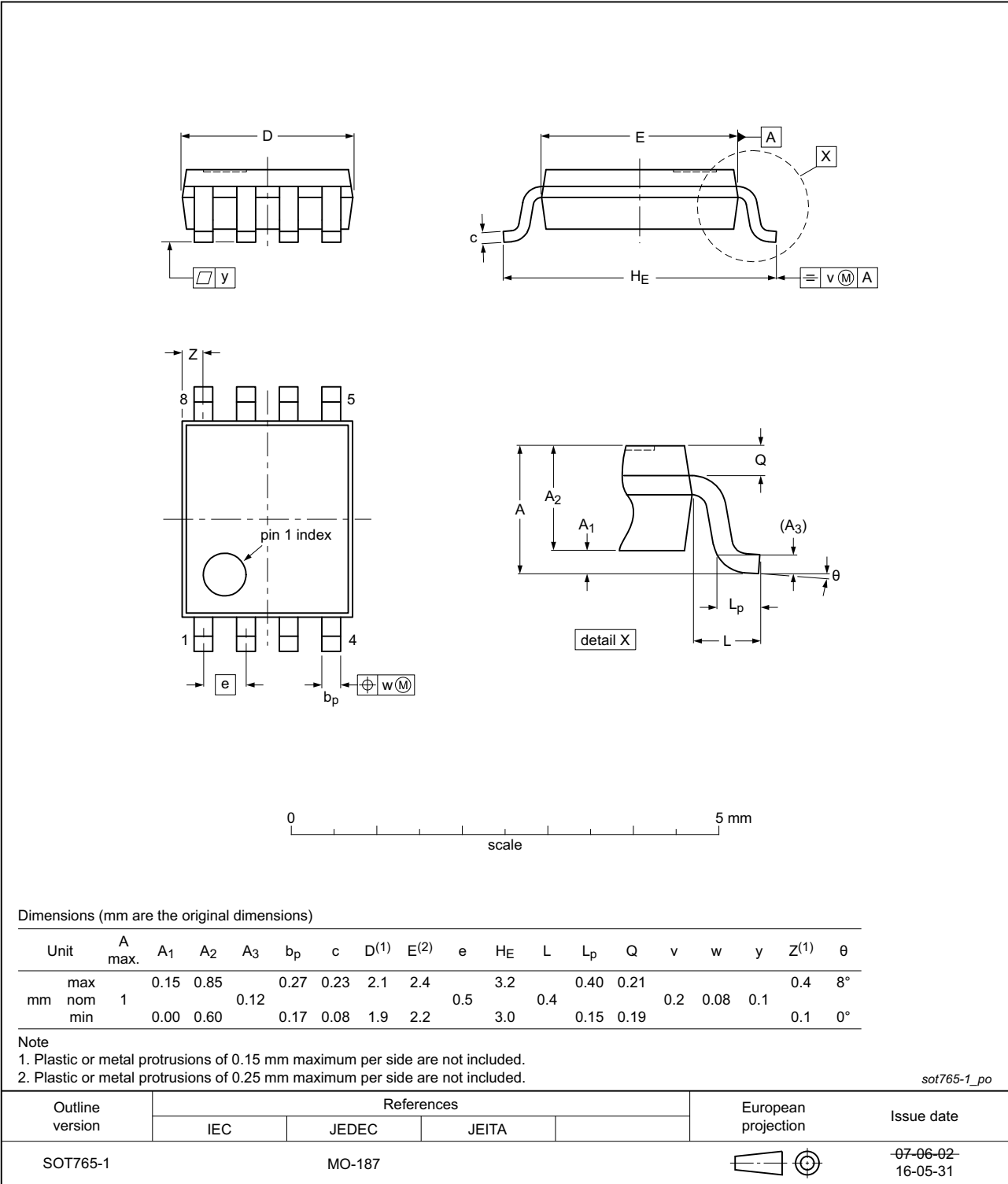


Fig 20. Package outline SOT765-1 (VSSOP8)

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm

SOT833-1

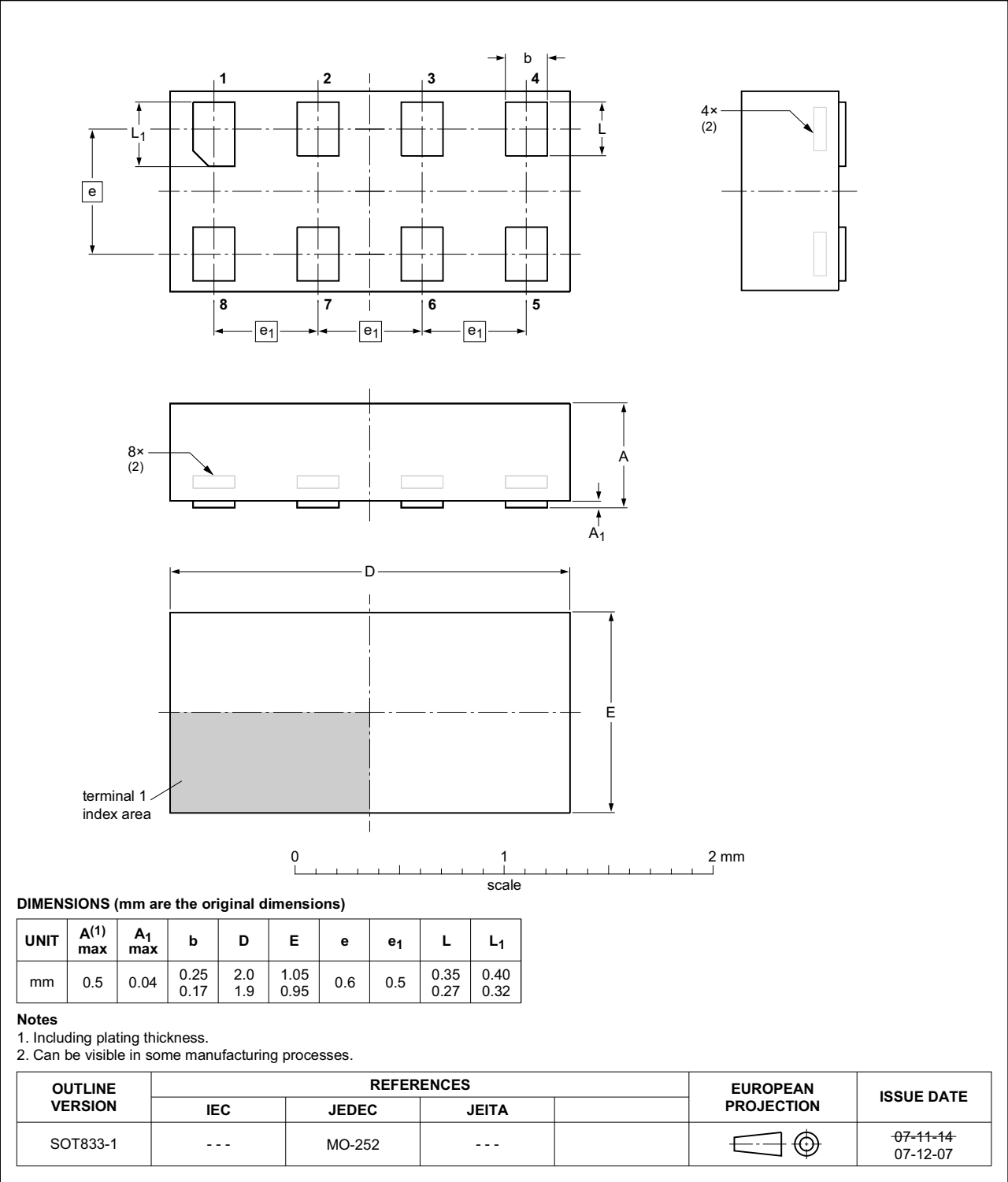


Fig 21. Package outline SOT833-1 (XSON8)

XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.35 x 1 x 0.5 mm

SOT1089

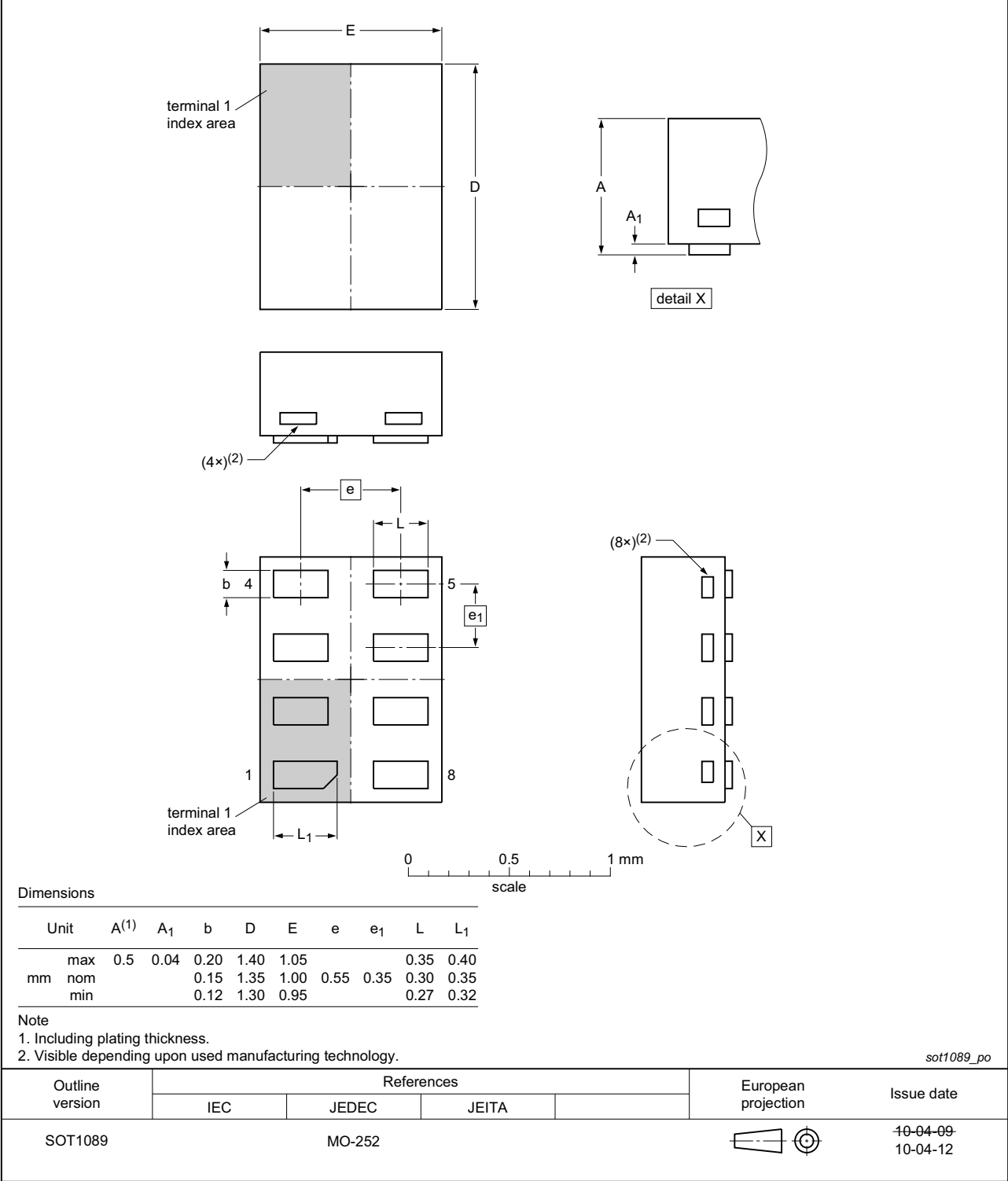


Fig 22. Package outline SOT1089 (XSON8)

XSON8: plastic extremely thin small outline package; no leads;  
8 terminals; body 3 x 2 x 0.5 mm

SOT996-2

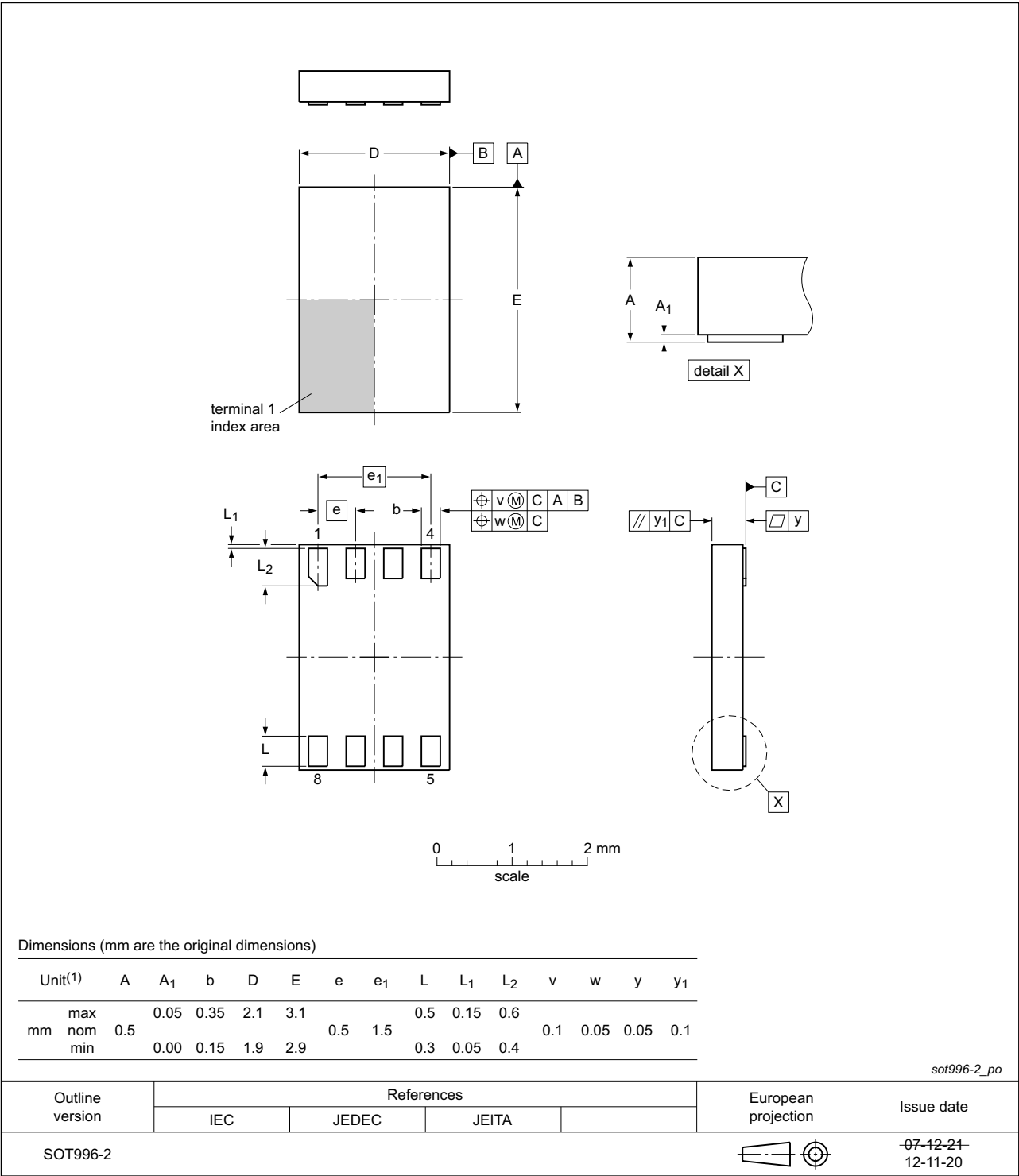


Fig 23. Package outline SOT996-2 (XSON8)

XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.2 x 1.0 x 0.35 mm

SOT1116

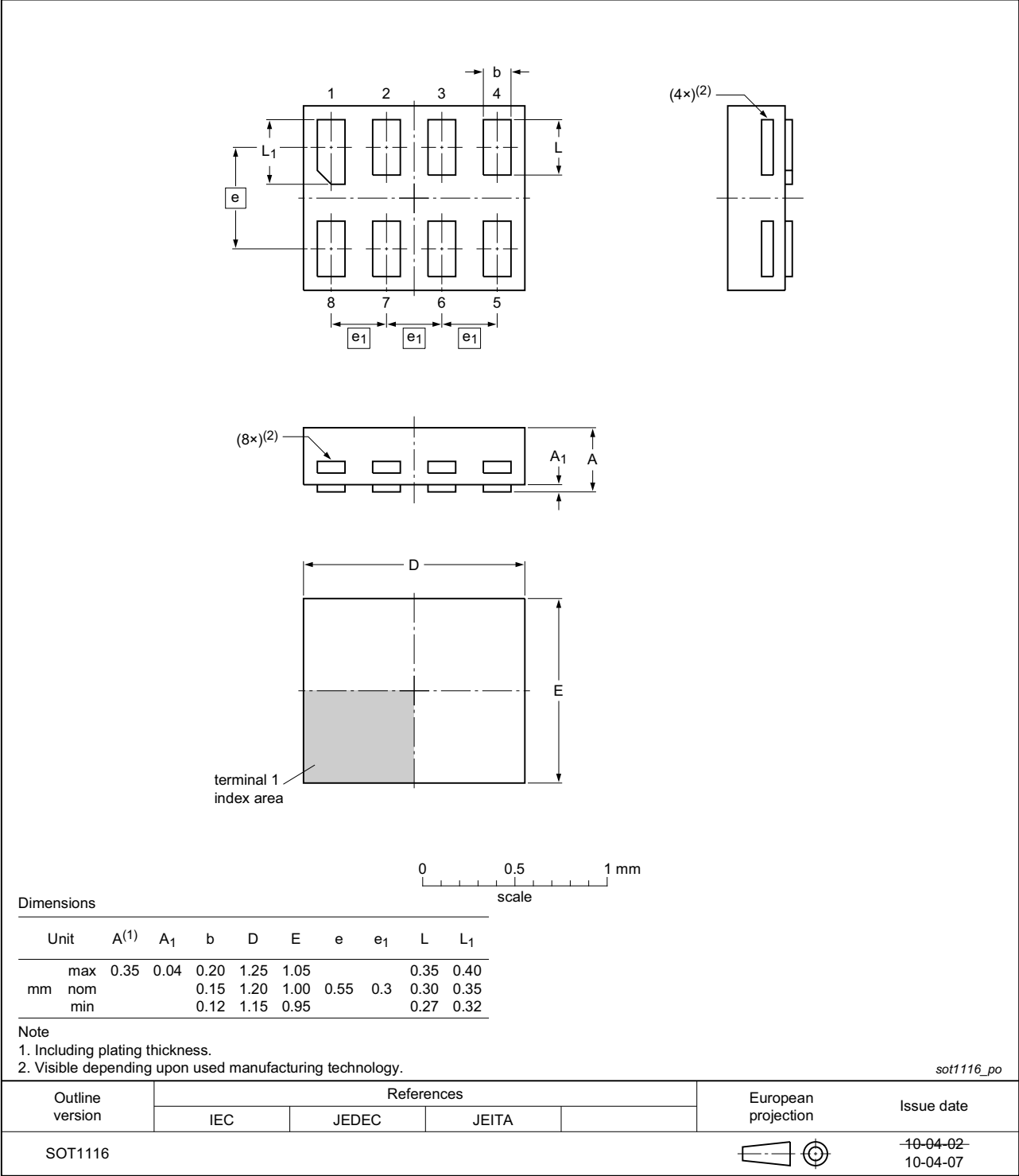


Fig 24. Package outline SOT1116 (XSON8)

XSON8: extremely thin small outline package; no leads;  
8 terminals; body 1.35 x 1.0 x 0.35 mm

SOT1203

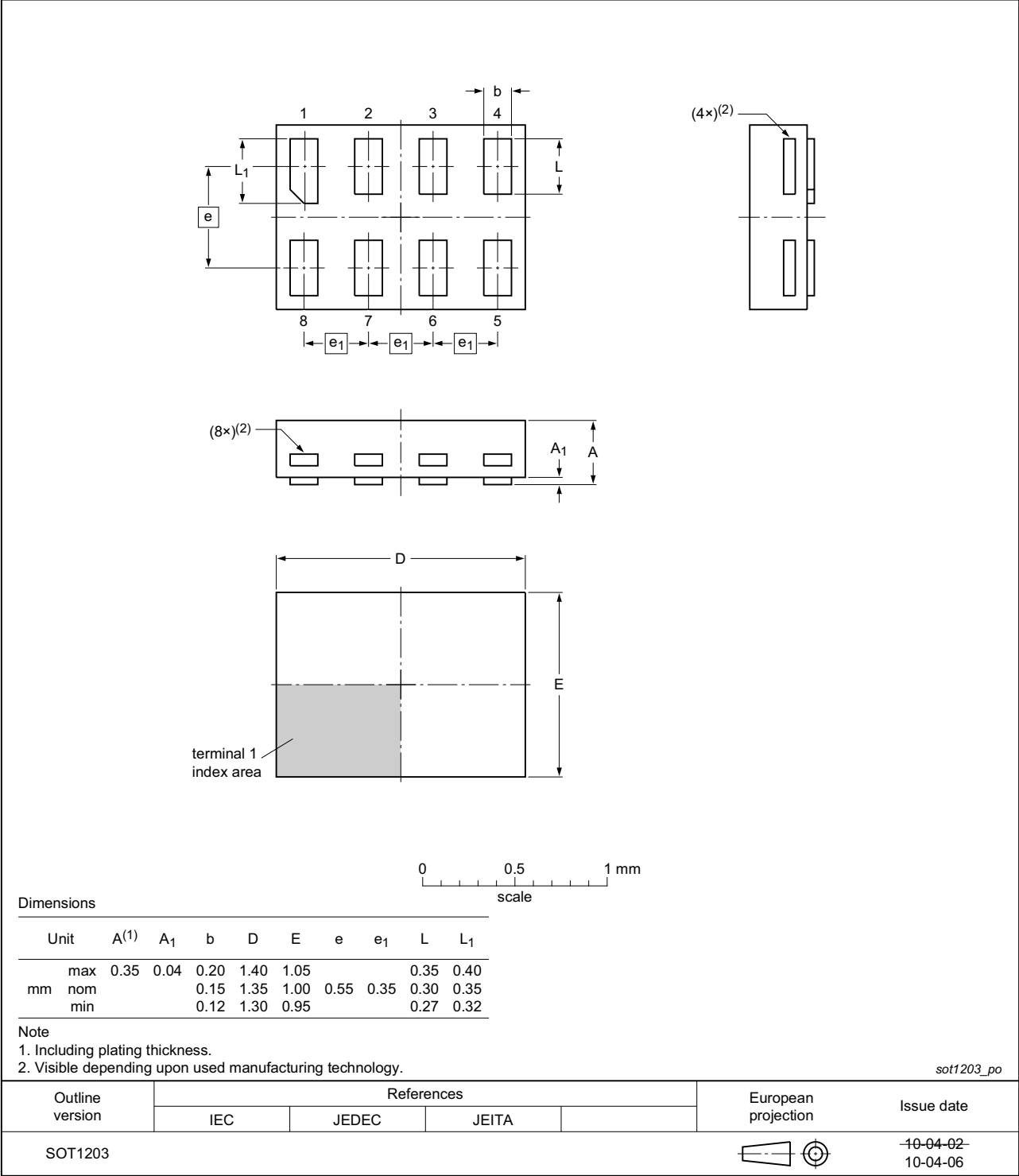


Fig 25. Package outline SOT1203 (XSON8)

## 14. Abbreviations

Table 12. Abbreviations

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

## 15. Revision history

Table 13. Revision history

| Document ID    | Release date                                                                                                                  | Data sheet status  | Change notice | Supersedes     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|----------------|
| 74LVC1G123 v.5 | 20160614                                                                                                                      | Product data sheet | -             | 74LVC1G123 v.4 |
| Modifications: | <ul style="list-style-type: none"> <li><a href="#">Figure 20</a>, package outline drawing for SOT765-1 has changed</li> </ul> |                    |               |                |
| 74LVC1G123 v.4 | 20131127                                                                                                                      | Product data sheet | -             | 74LVC1G123 v.3 |
| Modifications: | <ul style="list-style-type: none"> <li>74LVC1G123GM (XQFN8) removed.</li> </ul>                                               |                    |               |                |
| 74LVC1G123 v.3 | 20130329                                                                                                                      | Product data sheet | -             | 74LVC1G123 v.2 |
| Modifications: | <ul style="list-style-type: none"> <li>For type number 74LVC1G123GD XSON8U has changed to XSON8.</li> </ul>                   |                    |               |                |
| 74LVC1G123 v.2 | 20120801                                                                                                                      | Product data sheet | -             | 74LVC1G123 v.1 |
| Modifications: | <ul style="list-style-type: none"> <li>V<sub>HYS</sub> conditions and limits corrected (errata).</li> </ul>                   |                    |               |                |
| 74LVC1G123 v.1 | 20120123                                                                                                                      | Product data sheet | -             | -              |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition                                                                            |
|-----------------------------------|-------------------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

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

[2] The term 'short data sheet' is explained in section "Definitions".

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

### 16.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 16.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Non-automotive qualified products** — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond

NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

## 16.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 17. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 18. Contents

---

|           |                                                 |           |
|-----------|-------------------------------------------------|-----------|
| <b>1</b>  | <b>General description</b> .....                | <b>1</b>  |
| <b>2</b>  | <b>Features and benefits</b> .....              | <b>1</b>  |
| <b>3</b>  | <b>Ordering information</b> .....               | <b>2</b>  |
| <b>4</b>  | <b>Marking</b> .....                            | <b>2</b>  |
| <b>5</b>  | <b>Functional diagram</b> .....                 | <b>3</b>  |
| <b>6</b>  | <b>Pinning information</b> .....                | <b>4</b>  |
| 6.1       | Pinning .....                                   | 4         |
| 6.2       | Pin description .....                           | 5         |
| <b>7</b>  | <b>Functional description</b> .....             | <b>5</b>  |
| <b>8</b>  | <b>Limiting values</b> .....                    | <b>6</b>  |
| <b>9</b>  | <b>Recommended operating conditions</b> .....   | <b>6</b>  |
| <b>10</b> | <b>Static characteristics</b> .....             | <b>7</b>  |
| 10.1      | Waveform transfer characteristics .....         | 9         |
| <b>11</b> | <b>Dynamic characteristics</b> .....            | <b>10</b> |
| <b>12</b> | <b>Waveforms, graphs and test circuit</b> ..... | <b>14</b> |
| <b>13</b> | <b>Package outline</b> .....                    | <b>21</b> |
| <b>14</b> | <b>Abbreviations</b> .....                      | <b>28</b> |
| <b>15</b> | <b>Revision history</b> .....                   | <b>28</b> |
| <b>16</b> | <b>Legal information</b> .....                  | <b>29</b> |
| 16.1      | Data sheet status .....                         | 29        |
| 16.2      | Definitions .....                               | 29        |
| 16.3      | Disclaimers .....                               | 29        |
| 16.4      | Trademarks .....                                | 30        |
| <b>17</b> | <b>Contact information</b> .....                | <b>30</b> |
| <b>18</b> | <b>Contents</b> .....                           | <b>31</b> |

---

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

---

© NXP Semiconductors N.V. 2016.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 14 June 2016

Document identifier: 74LVC1G123