

74LVC1G123-Q100

Single retriggerable monostable multivibrator; Schmitt trigger inputs

Rev. 2 — 13 June 2016

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 $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Wide supply voltage range from 1.65 V to 5.5 V
- High noise immunity
- $\pm 24\text{ mA}$ output drive ($V_{CC} = 3.0\text{ V}$)
- 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 Ω)
- Multiple package options

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

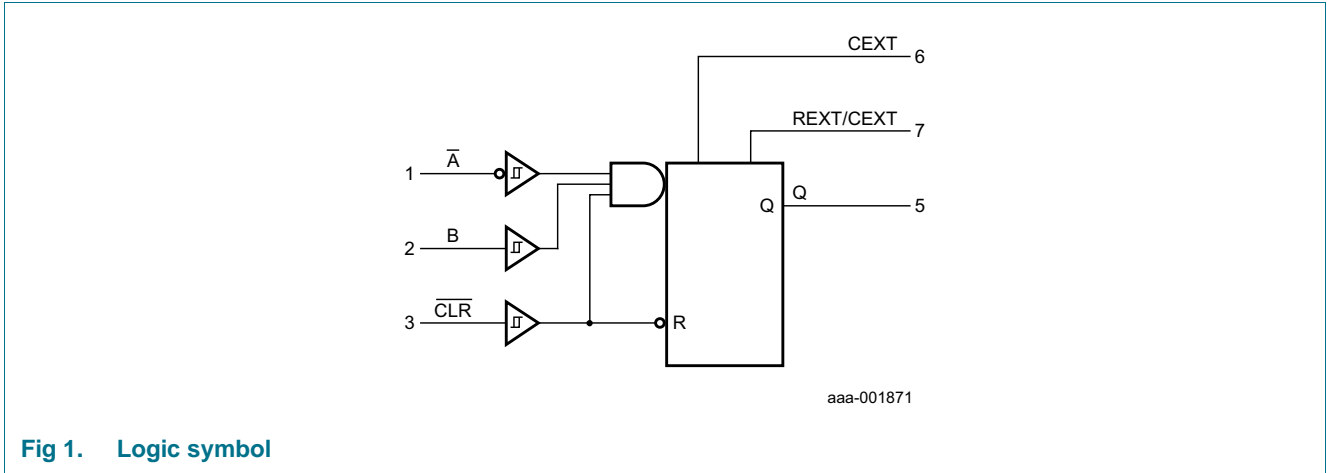


Fig 1. Logic symbol

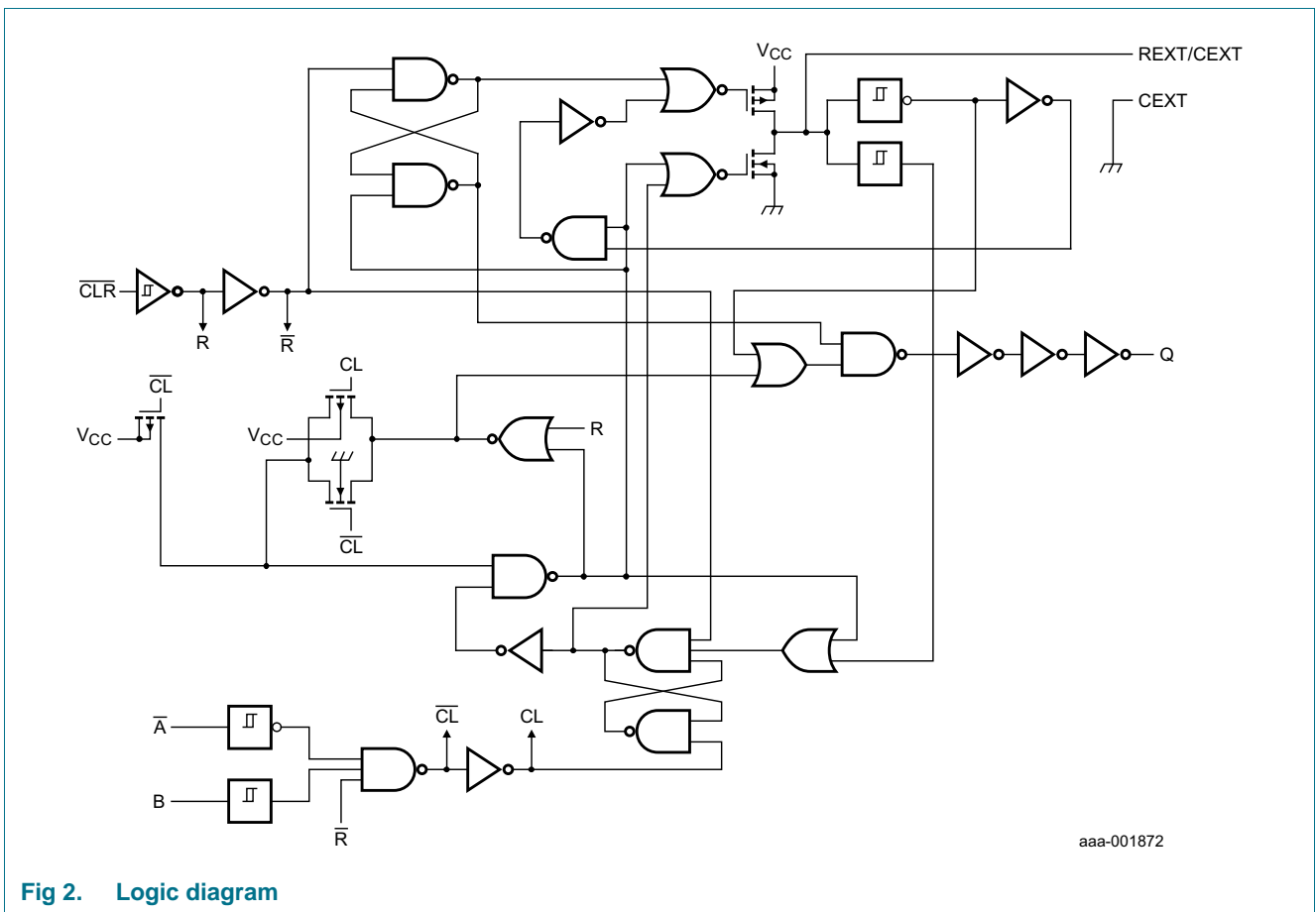


Fig 2. Logic diagram

6. Pinning information

6.1 Pinning

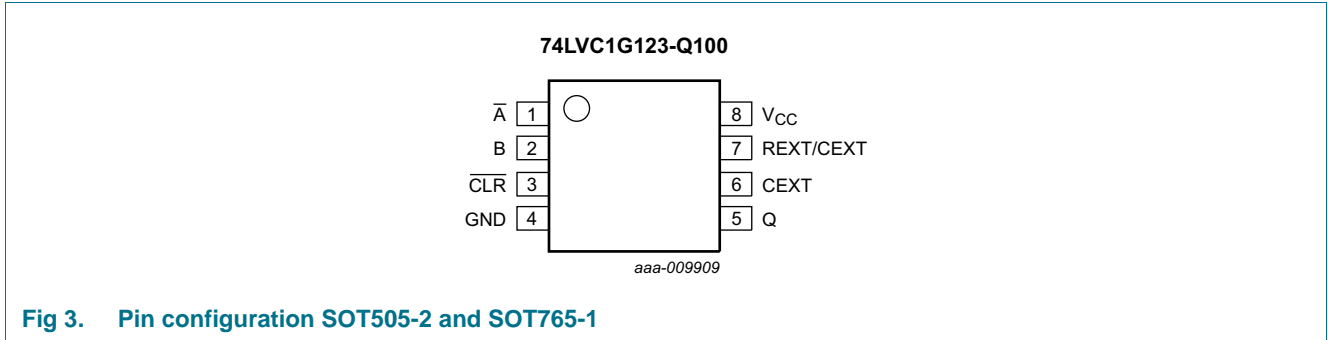


Fig 3. Pin configuration SOT505-2 and SOT765-1






6.2 Pin description

Table 3. Pin description



| Symbol | Pin | Description |
|-------------------------|-----|--|
| \bar{A} | 1 | negative-edge triggered input |
| B | 2 | positive-edge triggered input |
| $\overline{\text{CLR}}$ | 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 _{CC} | 8 | supply voltage |

7. Functional description

Table 4. Function table^[1]

| Input | | | Output |
|-------|-----------|---|--|
| CLR | \bar{A} | B | Q |
| L | X | X | L |
| X | H | X |  ^[2] |
| X | X | L |  ^[2] |
| 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 | [1] | -0.5 | +6.5 | V |
| V _O | output voltage | Active mode [1] | -0.5 | V _{CC} + 0.5 | V |
| | | Power-down mode [1][2] | -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} | - | ±50 | mA |
| I _O | output current | V _O = 0 V to V _{CC} | - | ±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 [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_{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.

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 |
| Δt/ΔV | 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 °C to +85 °C | | | | | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | I _O = -100 μA; V _{CC} = 1.65 V to 5.5 V | V _{CC} - 0.1 | - | - | V |
| | | I _O = -4 mA; V _{CC} = 1.65 V | 1.2 | - | - | V |
| | | I _O = -8 mA; V _{CC} = 2.3 V | 1.9 | - | - | V |
| | | I _O = -12 mA; V _{CC} = 2.7 V | 2.2 | - | - | V |
| | | I _O = -24 mA; V _{CC} = 3.0 V | 2.4 | - | - | V |
| | | I _O = -32 mA; V _{CC} = 4.5 V | 3.8 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V | - | - | 0.1 | V |
| | | I _O = 4 mA; V _{CC} = 1.65 V | - | - | 0.45 | V |
| | | I _O = 8 mA; V _{CC} = 2.3 V | - | - | 0.3 | V |
| | | I _O = 12 mA; V _{CC} = 2.7 V | - | - | 0.4 | V |
| | | I _O = 24 mA; V _{CC} = 3.0 V | - | - | 0.55 | V |
| | | I _O = 32 mA; V _{CC} = 4.5 V | - | - | 0.55 | V |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | ±2 | μA |
| I _{OFF} | power-off leakage current | V _I or V _O = 5.5 V; V _{CC} = 0 V | - | - | ±2 | μA |
| I _{CC} | supply current | V _I = 5.5 V or GND | | | | |
| | | Quiescent; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A | - | 0.1 | 10 | μA |
| | | Active state; REXT/CEXT = 0.5V _{CC} | | | | |
| | | V _{CC} = 1.65 V | - | - | 80 | μA |
| | | V _{CC} = 2.3 V | - | - | 130 | μA |
| | | V _{CC} = 3 V | - | - | 240 | μA |
| | | V _{CC} = 4.5 V | - | - | 400 | μA |
| | | V _{CC} = 5.5 V | - | - | 650 | μA |
| 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_{amb} = -40 °C to +125 °C | | | | | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | I _O = -100 μA; V _{CC} = 1.65 V to 5.5 V | V _{CC} - 0.1 | - | - | V |
| | | I _O = -4 mA; V _{CC} = 1.65 V | 1.2 | - | - | V |
| | | I _O = -8 mA; V _{CC} = 2.3 V | 1.9 | - | - | V |
| | | I _O = -12 mA; V _{CC} = 2.7 V | 2.2 | - | - | V |
| | | I _O = -24 mA; V _{CC} = 3.0 V | 2.4 | - | - | V |
| V _{OL} | LOW-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | I _O = 100 μA; V _{CC} = 1.65 V to 5.5 V | - | - | 0.1 | V |
| | | I _O = 4 mA; V _{CC} = 1.65 V | - | - | 0.45 | V |
| | | I _O = 8 mA; V _{CC} = 2.3 V | - | - | 0.3 | V |
| | | I _O = 12 mA; V _{CC} = 2.7 V | - | - | 0.4 | V |
| | | I _O = 24 mA; V _{CC} = 3.0 V | - | - | 0.55 | V |
| I _l | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | - | ±10 | μA |
| | | V _I or V _O = 5.5 V; V _{CC} = 0 V | - | - | ±10 | μA |
| I _{CC} | supply current | V _I = 5.5 V or GND | | | | |
| | | Quiescent; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A | - | - | 20 | μA |
| | | Active state; REXT/CEXT = 0.5V _{CC} | | | | |
| | | V _{CC} = 1.65 V | - | - | 80 | μA |
| | | V _{CC} = 2.3 V | - | - | 130 | μA |
| | | V _{CC} = 3 V | - | - | 240 | μA |
| | | V _{CC} = 4.5 V | - | - | 400 | μA |
| V _{CC} = 5.5 V | - | - | 650 | μA | | |

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

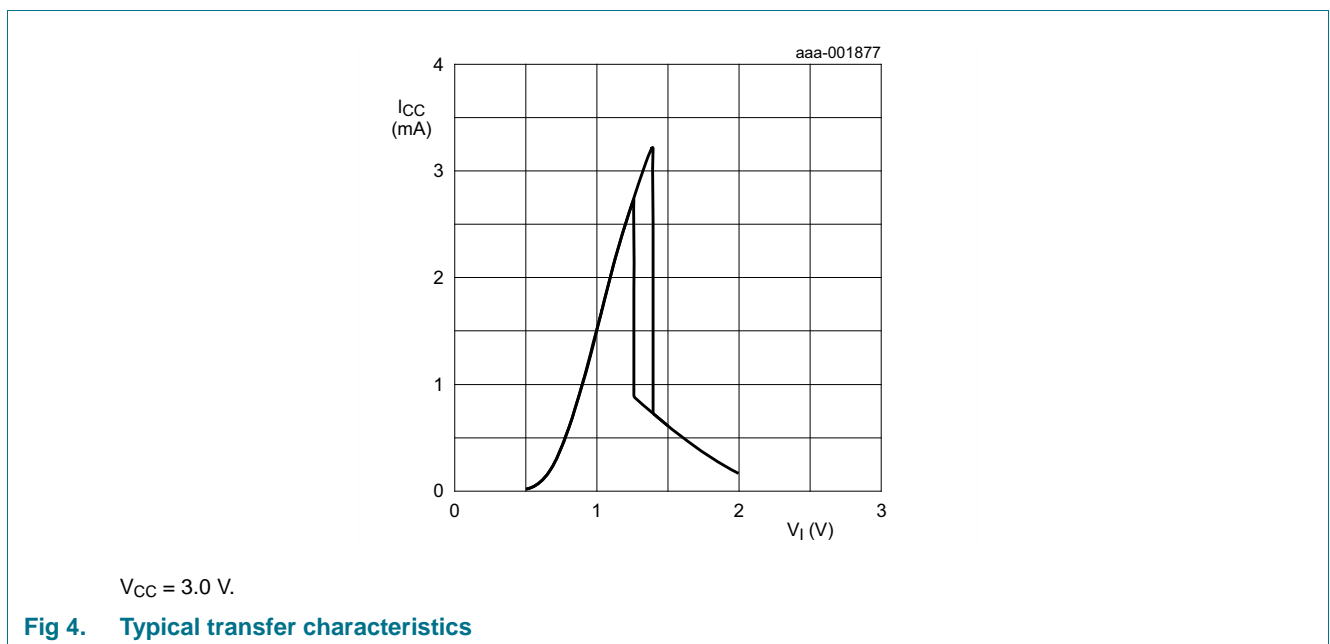
Table 8. Transfer characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

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

[1] All typical values are measured at T_{amb} = 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 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 | \overline{A} , B to Q; see Figure 5 ^[2] | | | | | | |
| | | C _L = 15 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.5 | 7.1 | 16.3 | 2.5 | 17.6 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.9 | - | 10.3 | 1.9 | 11.2 | ns |
| | | V _{CC} = 2.7 V | 1.9 | - | 8.5 | 1.9 | 9.3 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.5 | - | 7.6 | 1.5 | 8.3 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 1.2 | - | 5.3 | 1.2 | 5.8 | ns |
| | | C _L = 30 pF or C _L = 50 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.9 | 7.8 | 17.6 | 2.9 | 19.0 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.2 | - | 11.3 | 2.2 | 12.3 | ns |
| | | V _{CC} = 2.7 V | 2.7 | - | 10.5 | 2.7 | 11.4 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.0 | - | 9.5 | 2.0 | 10.3 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 1.5 | - | 6.7 | 1.5 | 7.2 | ns |
| | | \overline{CLR} to Q; see Figure 5 ^[2] | | | | | | |
| | | C _L = 15 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 3.0 | 6.9 | 16.2 | 3.0 | 17.4 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.2 | - | 9.6 | 2.2 | 10.5 | ns |
| | | V _{CC} = 2.7 V | 2.2 | - | 8.2 | 2.2 | 8.9 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.0 | - | 7.3 | 2.0 | 8.0 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 1.5 | - | 5.1 | 1.5 | 5.5 | ns |
| | | C _L = 30 pF or C _L = 50 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 3.3 | 7.5 | 17.2 | 3.8 | 18.6 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.5 | - | 10.3 | 2.0 | 11.2 | ns |
| V _{CC} = 2.7 V | 2.8 | - | 9.3 | 2.8 | 10.2 | ns | | |
| V _{CC} = 3.0 V to 3.6 V | 1.5 | - | 8.4 | 1.5 | 9.2 | ns | | |
| V _{CC} = 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 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 | CLR to Q (trigger); see Figure 5 ^[2] | | | | | | |
| | | C _L = 15 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.7 | 7.6 | 17.4 | 2.7 | 18.9 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.1 | - | 11.0 | 2.1 | 12.0 | ns |
| | | V _{CC} = 2.7 V | 2.1 | - | 9.2 | 2.1 | 10.0 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.7 | - | 8.2 | 1.7 | 8.9 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 1.4 | - | 5.9 | 1.4 | 6.4 | ns |
| | | C _L = 30 pF or C _L = 50 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 3.1 | 8.3 | 18.8 | 3.3 | 20.3 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.5 | - | 12.0 | 2.5 | 13.1 | ns |
| | | V _{CC} = 2.7 V | 2.8 | - | 11.1 | 2.8 | 12.1 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.0 | - | 10.1 | 2.0 | 11.0 | ns |
| V _{CC} = 4.5 V to 5.5 V | 1.5 | - | 7.1 | 1.5 | 7.7 | ns | | |
| t _w | pulse width | input \overline{A} LOW; B HIGH; see Figure 5 and Figure 6 | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 8.0 | - | - | 8.0 | - | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 4.0 | - | - | 4.0 | - | ns |
| | | V _{CC} = 2.7 V | 3.0 | - | - | 3.0 | - | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 3.0 | - | - | 3.0 | - | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 2.5 | - | - | 2.5 | - | ns |
| | | input \overline{CLR} LOW; see Figure 5 and Figure 7 | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 8.0 | - | - | 8.0 | - | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 4.0 | - | - | 4.0 | - | ns |
| | | V _{CC} = 2.7 V | 3.0 | - | - | 3.0 | - | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 3.0 | - | - | 3.0 | - | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 2.5 | - | - | 2.5 | - | ns |

Table 9. Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|----------------------------------|----------------------|--|------------------|--------------------|------|-------------------|------|------|
| | | | Min | Typ ^[1] | Max | Min | Max | |
| t _w | pulse width | output Q HIGH; see Figure 5 , Figure 6 and Figure 7 ; R _{EXT} = 10 kΩ | | | | | | |
| | | C _{EXT} = 100 pF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 1.4 | 2.2 | - | 2.2 | μs |
| | | V _{CC} = 2.3 V to 2.7 V | - | 1.3 | 1.8 | - | 1.8 | μs |
| | | V _{CC} = 2.7 V | - | 1.2 | 1.8 | - | 1.8 | μs |
| | | V _{CC} = 3.0 V to 3.6 V | - | 1.2 | 1.8 | - | 1.8 | μs |
| | | V _{CC} = 4.5 V to 5.5 V | - | 1.2 | 1.8 | - | 1.8 | μs |
| | | C _{EXT} = 0.01 μF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 100 | 110 | - | 110 | μs |
| | | V _{CC} = 2.3 V to 2.7 V | - | 100 | 110 | - | 110 | μs |
| | | V _{CC} = 2.7 V | - | 100 | 110 | - | 110 | μs |
| | | V _{CC} = 3.0 V to 3.6 V | - | 100 | 110 | - | 110 | μs |
| | | V _{CC} = 4.5 V to 5.5 V | - | 100 | 110 | - | 110 | μs |
| | | C _{EXT} = 0.1 μF | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 1.0 | 1.05 | - | 1.05 | ms |
| | | V _{CC} = 2.7 V | - | 1.0 | 1.05 | - | 1.05 | ms |
| | | V _{CC} = 3.0 V to 3.6 V | - | 1.0 | 1.05 | - | 1.05 | ms |
| | | V _{CC} = 3.0 V to 3.6 V | - | 1.0 | 1.05 | - | 1.05 | ms |
| V _{CC} = 4.5 V to 5.5 V | - | 1.0 | 1.05 | - | 1.05 | ms | | |
| t _{trig} | retrigger time | A, B; see Figure 6 | | | | | | |
| | | C _{EXT} = 100 pF; R _{EXT} = 5 kΩ | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 174 | - | - | - | ns |
| | | V _{CC} = 2.3 V to 2.7 V | - | 59 | - | - | - | ns |
| | | C _{EXT} = 100 pF; R _{EXT} = 1 kΩ | | | | | | |
| | | V _{CC} = 3.0 V to 3.6 V | - | 32 | - | - | - | ns |
| | | V _{CC} = 4.5 V to 5.5 V | - | 20 | - | - | - | ns |
| | | C _{EXT} = 100 μF; R _{EXT} = 5 kΩ | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | - | 14 | - | - | - | ms |
| | | V _{CC} = 2.3 V to 2.7 V | - | 10 | - | - | - | ms |
| | | C _{EXT} = 100 μF; R _{EXT} = 1 kΩ | | | | | | |
| V _{CC} = 3.0 V to 3.6 V | - | 10 | - | - | - | ms | | |
| V _{CC} = 4.5 V to 5.5 V | - | 8 | - | - | - | ms | | |
| R _{ext} | external resistance | see Figure 10 , Figure 11 and Figure 12 | | | | | | |
| | | V _{CC} = 2.0 V | 5 | - | - | - | - | kΩ |
| | | V _{CC} ≥ 3.0 V | 1 | - | - | - | - | kΩ |
| C _{ext} | external capacitance | V _{CC} = 5.0 V; see Figure 10 , Figure 11 and Figure 12 | - | - | - | - | - | pF |

Table 9. Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------|-------------------------------|---|------------------|--------------------|-----|-------------------|-----|------|
| | | | Min | Typ ^[1] | Max | Min | Max | |
| C _{PD} | power dissipation capacitance | V _I = GND to V _{CC} ; C _{EXT} = 0 pF | | | | | | |
| | | R _{EXT} = 5 kΩ | | | | | | |
| | | V _{CC} = 1.8 V | - | 35 | - | - | - | pF |
| | | V _{CC} = 2.5 V | - | 35 | - | - | - | pF |
| | | R _{EXT} = 1 kΩ | | | | | | |
| | | V _{CC} = 3.3 V | - | 27 | - | - | - | pF |
| | | V _{CC} = 5.0 V | - | 29 | - | - | - | pF |

[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.8 V, 2.5 V, 3.3 V and 5.0 V respectively.

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

[3] For other R_{EXT} and C_{EXT} combinations see [Figure 10](#), [Figure 11](#) and [Figure 12](#). If C_{EXT} > 10 nF, the next formula is valid.

t_W = K × R_{EXT} × C_{EXT}, where:

t_W = typical output pulse width in ns;

R_{EXT} = external resistor in kΩ;

C_{EXT} = external capacitor in pF;

K = constant = 1; see [Figure 13](#) for typical "K" factor as function of V_{CC}.

12. Waveforms, graphs and test circuit

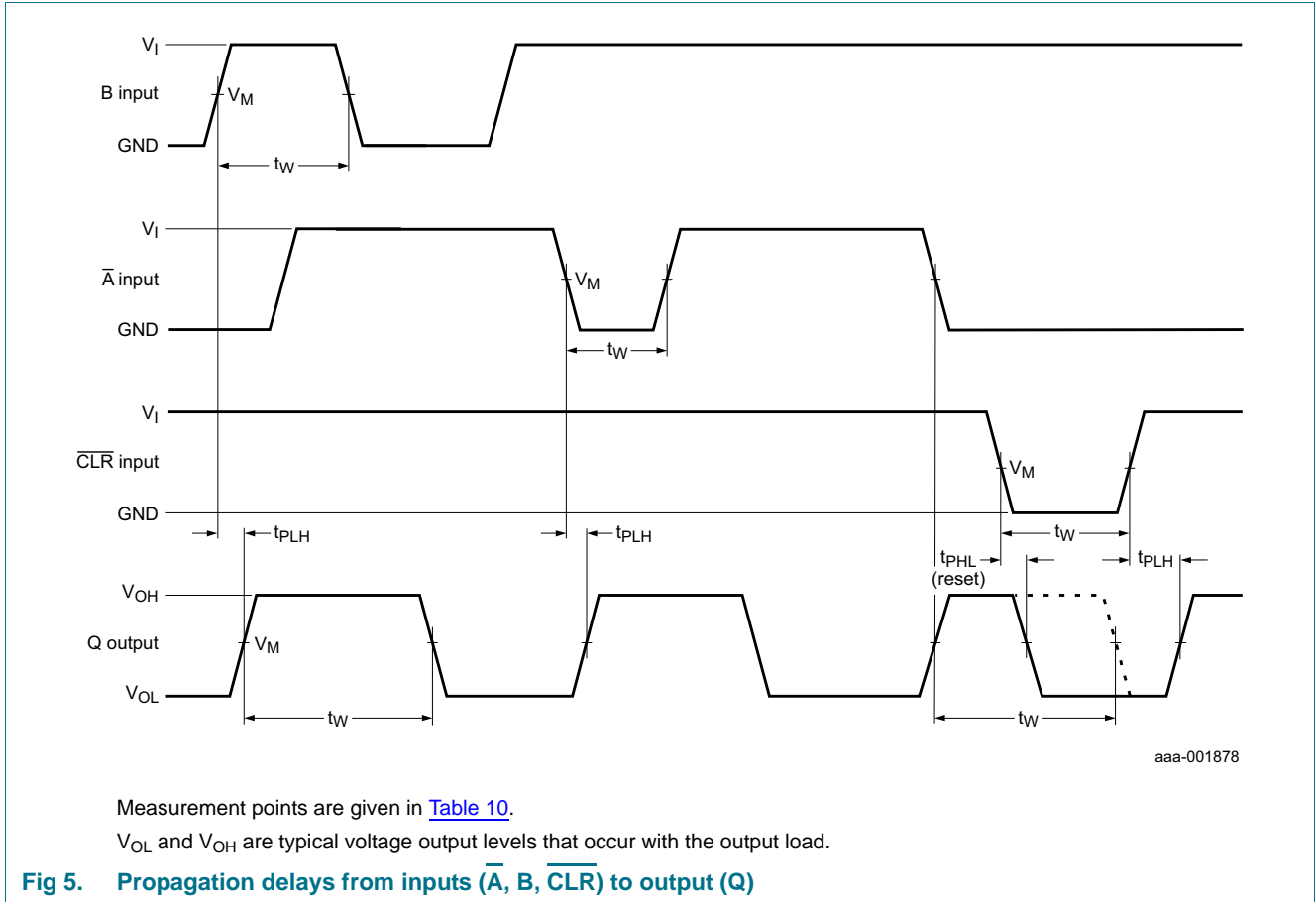


Table 10. Measurement points

| 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 | $0.5V_{CC}$ | $0.5V_{CC}$ |

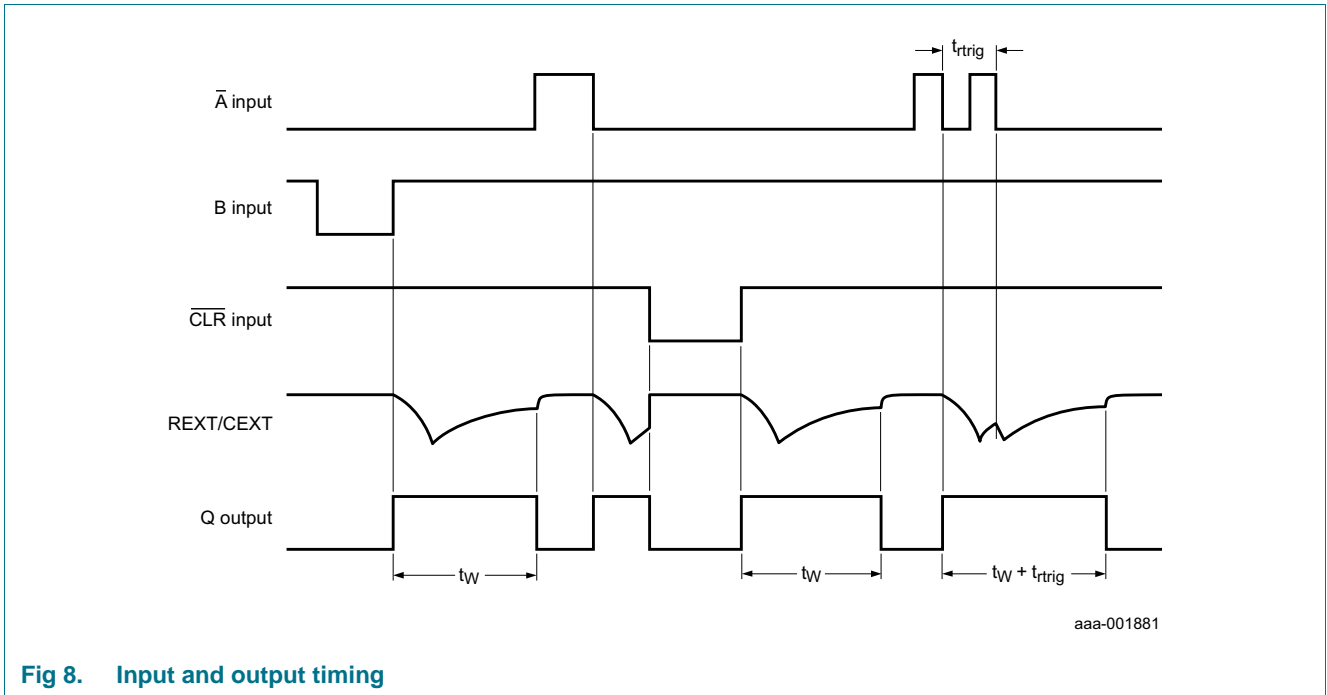


Fig 8. Input and output timing

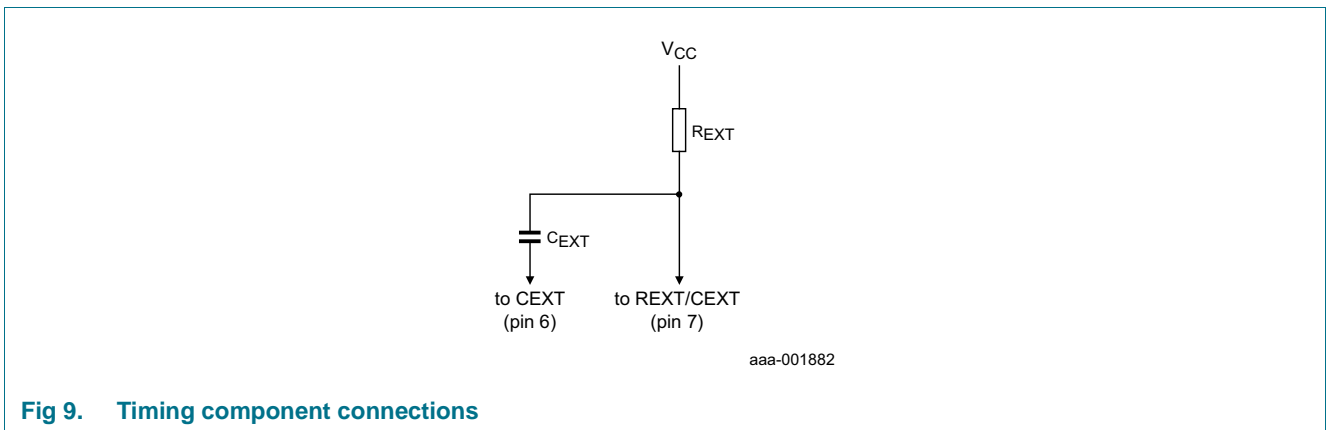
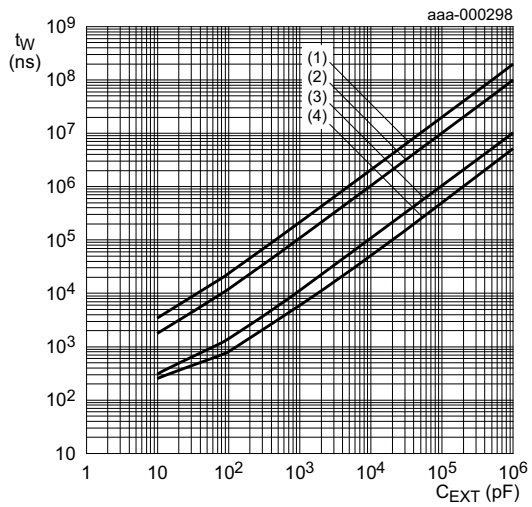


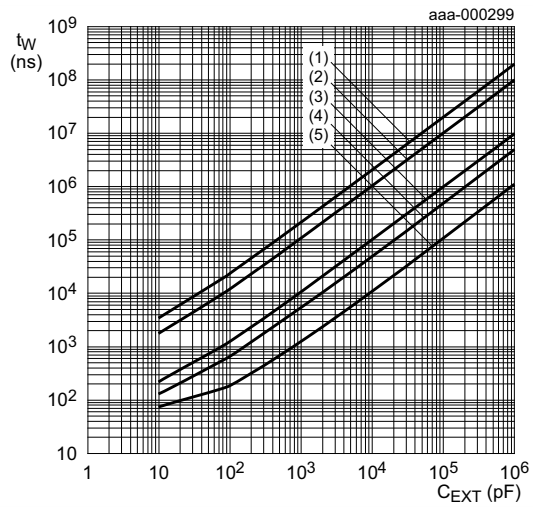
Fig 9. Timing component connections



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

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

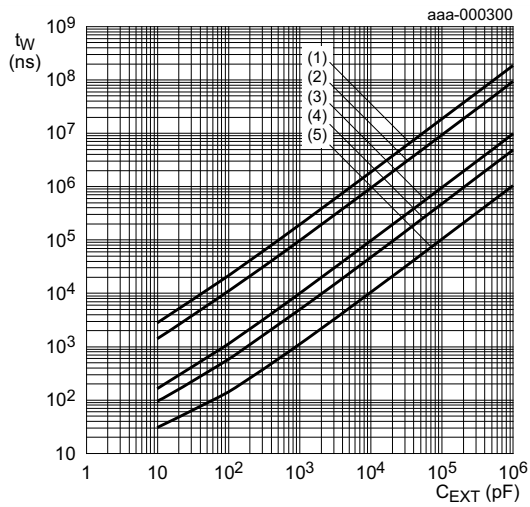
Fig 10. Typical output pulse width as a function of the external capacitor value



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

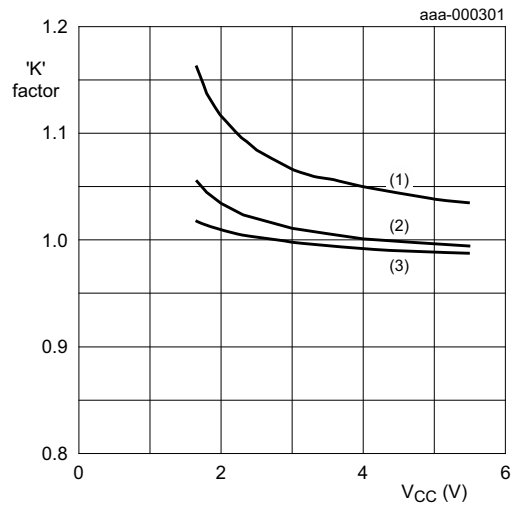
- (1) $R_{EXT} = 200\text{ k}\Omega$
- (2) $R_{EXT} = 100\text{ k}\Omega$
- (3) $R_{EXT} = 10\text{ k}\Omega$
- (4) $R_{EXT} = 5\text{ k}\Omega$
- (5) $R_{EXT} = 1\text{ k}\Omega$

Fig 11. Typical output pulse width as a function of the external capacitor value



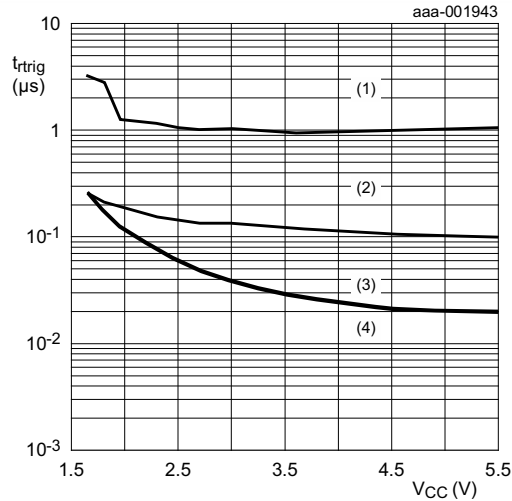
- $V_{CC} = 5.0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (1) $R_{EXT} = 200\text{ k}\Omega$
 - (2) $R_{EXT} = 100\text{ k}\Omega$
 - (3) $R_{EXT} = 10\text{ k}\Omega$
 - (4) $R_{EXT} = 5\text{ k}\Omega$
 - (5) $R_{EXT} = 1\text{ k}\Omega$

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



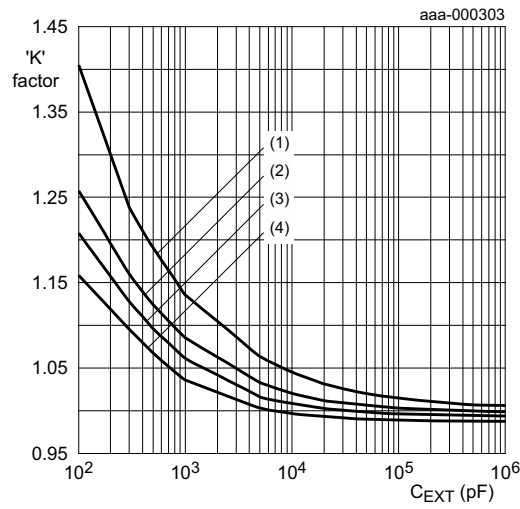
- $R_{EXT} = 10\text{ k}\Omega; T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (1) $C_{EXT} = 1000\text{ pF}$
 - (2) $C_{EXT} = 0.01\text{ }\mu\text{F}$
 - (3) $C_{EXT} = 0.1\text{ }\mu\text{F}$

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



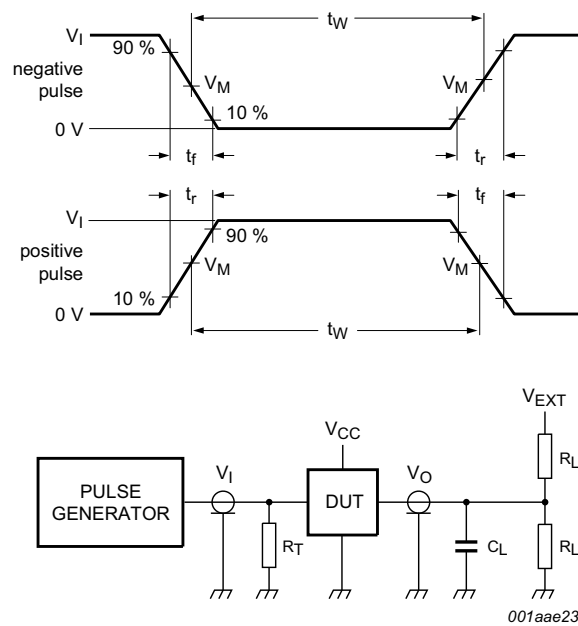
- $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (1) $C_{EXT} = 0.01\text{ }\mu\text{F}$
 - (2) $C_{EXT} = 1000\text{ pF}$
 - (3) $C_{EXT} = 100\text{ pF}$
 - (4) $C_{EXT} = 10\text{ pF}$

Fig 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}



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 16. 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} | ≤ 2.0 ns | 15 pF | 1 M Ω | open |
| 2.3 V to 2.7 V | V_{CC} | ≤ 2.0 ns | 15 pF | 1 M Ω | open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 15 pF | 1 M Ω | open |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 15 pF | 1 M Ω | open |
| 4.5 V to 5.5 V | V_{CC} | ≤ 2.5 ns | 15 pF | 1 M Ω | open |
| 1.65 V to 1.95 V | V_{CC} | ≤ 2.0 ns | 30 pF | 1 k Ω | open |
| 2.3 V to 2.7 V | V_{CC} | ≤ 2.0 ns | 30 pF | 500 Ω | open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 4.5 V to 5.5 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open |

13. Package outline

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

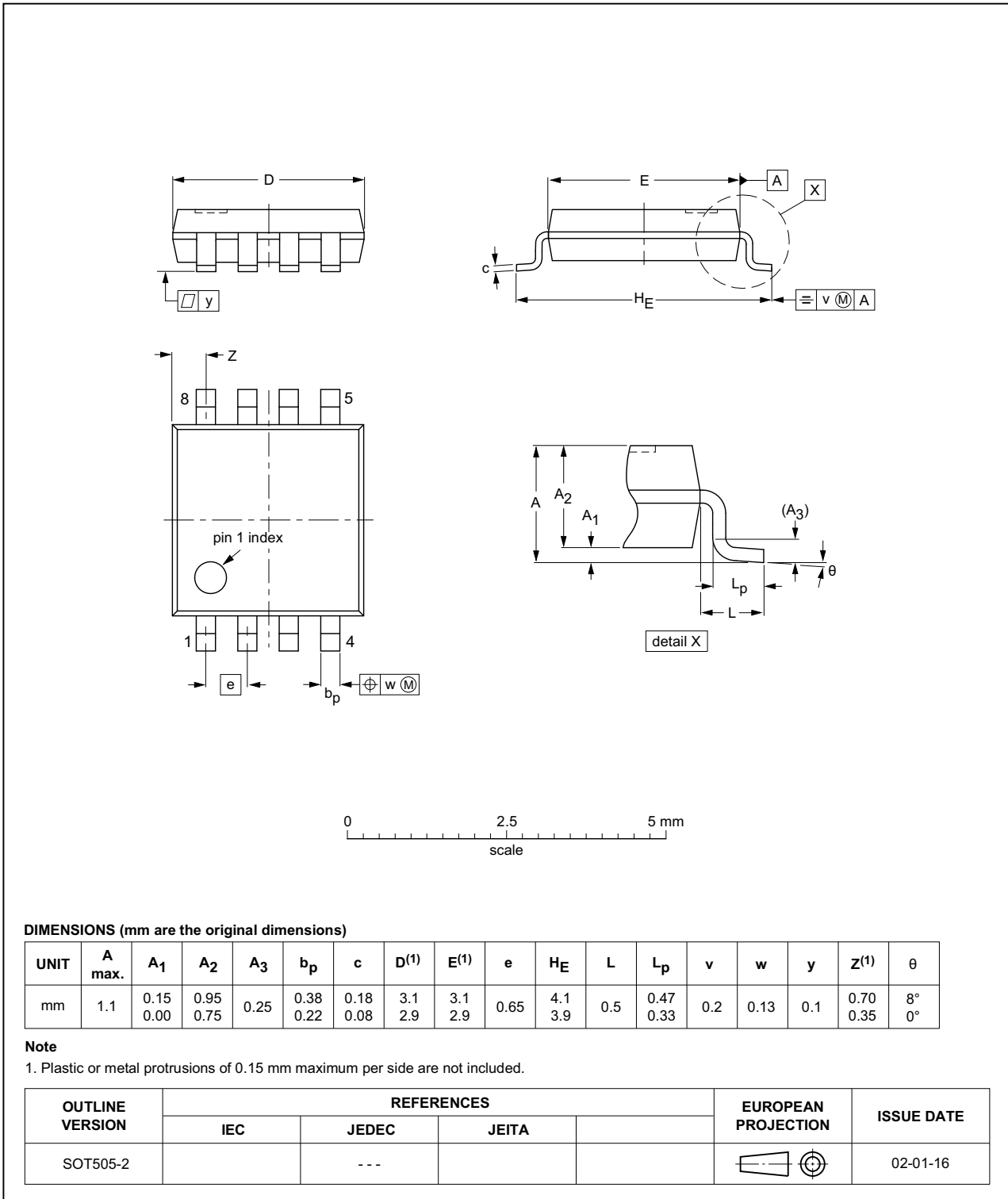


Fig 17. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

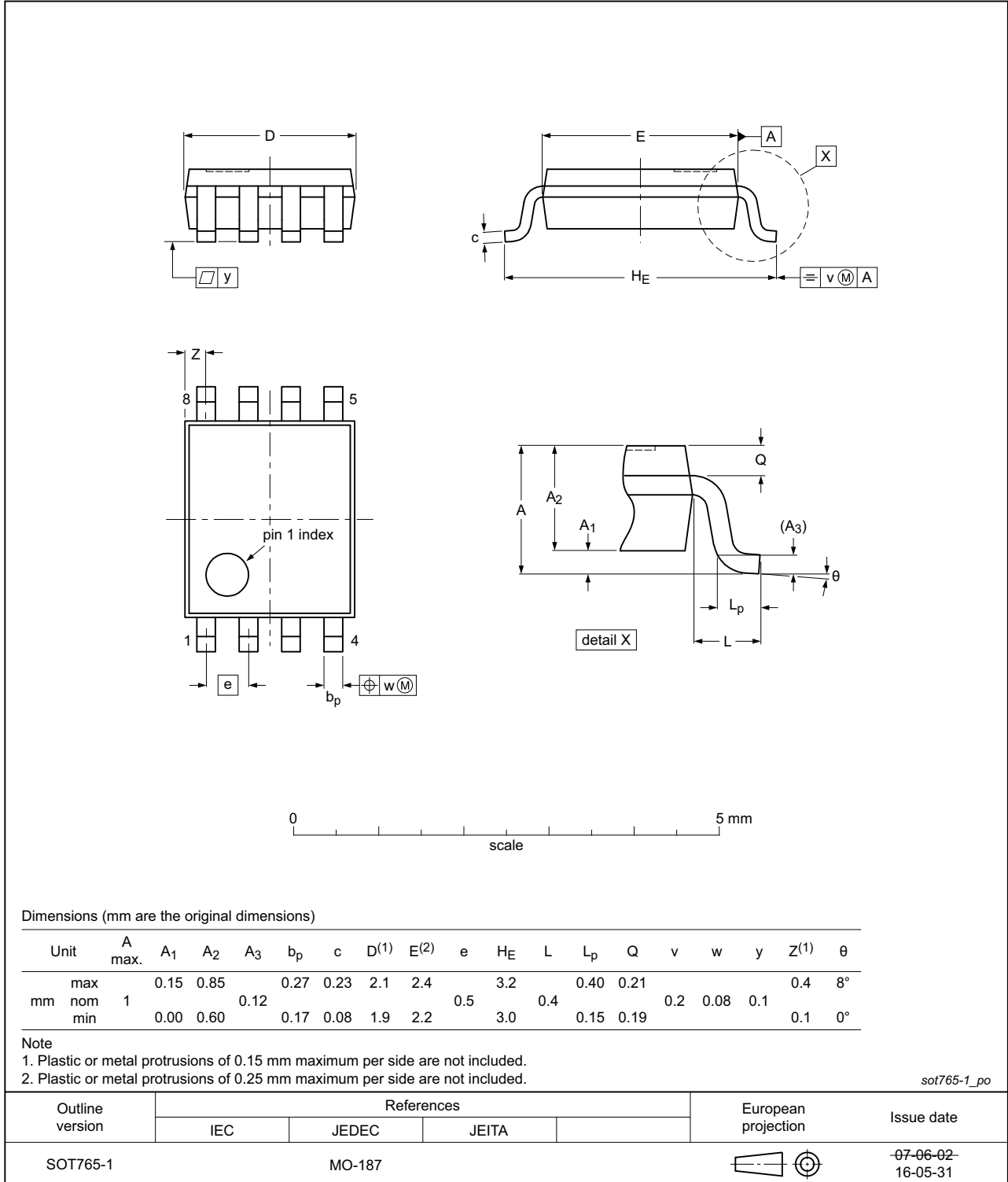


Fig 18. Package outline SOT765-1 (VSSOP8)

14. 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 |

15. Revision history

Table 13. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------------|---|--------------------|---------------|---------------------|
| 74LVC1G123_Q100 v.2 | 20160613 | Product data sheet | - | 74LVC1G123_Q100 v.1 |
| Modifications: | <ul style="list-style-type: none"> Figure 18, package outline drawing for SOT765-1 has changed | | | |
| 74LVC1G123_Q100 v.1 | 20140310 | Product data sheet | - | - |

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16.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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[2] The term 'short data sheet' is explained in section "Definitions".

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