

# 74LV123

## Dual retriggerable monostable multivibrator with reset

Rev. 11 — 15 January 2024

Product data sheet

## 1. General description

The 74LV123 is a dual retriggerable monostable multivibrator with reset. The basic output pulse width is programmed by selection of external components ( $R_{EXT}$  and  $C_{EXT}$ ). Once triggered this basic pulse width may be extended by retriggering either of the edge triggered inputs ( $n\bar{A}$  or  $nB$ ). By repeating this process, the output pulse period ( $nQ = HIGH$ ,  $nQ = LOW$ ) can be made as long as desired. Alternatively, an output delay can be terminated at any time by a LOW-going edge on input  $n\bar{RD}$ . Control inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess  $V_{CC}$ . Schmitt-trigger action at  $n\bar{A}$  and  $nB$  inputs makes the circuit tolerant of slower input rise and fall times.

## 2. Features and benefits

- Wide supply voltage range from 1.0 V to 5.5 V
- CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Optimized for low-voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between  $V_{CC} = 2.7$  V and  $V_{CC} = 3.6$  V
- Typical output ground bounce:  $< 0.8$  V at  $V_{CC} = 3.3$  V and  $T_{amb} = 25$  °C
- Typical HIGH-level output voltage ( $V_{OH}$ ) undershoot:  $> 2$  V at  $V_{CC} = 3.3$  V and  $T_{amb} = 25$  °C
- DC triggered from active HIGH or active LOW inputs
- Retriggerable for very long pulses up to 100 % duty factor
- Direct reset terminates output pulses
- Schmitt-trigger action on all inputs except for the reset input
- Complies with JEDEC standards:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

## 3. Ordering information

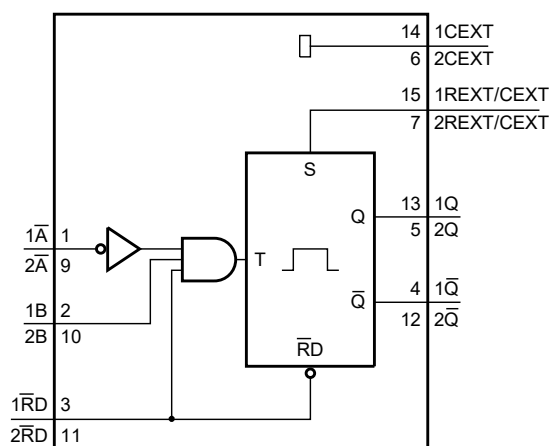
Table 1. Ordering information

| Type number               | Package           |         |                                                                           |                          |
|---------------------------|-------------------|---------|---------------------------------------------------------------------------|--------------------------|
|                           | Temperature range | Name    | Description                                                               | Version                  |
| <a href="#">74LV123D</a>  | -40 °C to +125 °C | SO16    | plastic small outline package; 16 leads;<br>body width 3.9 mm             | <a href="#">SOT109-1</a> |
| <a href="#">74LV123PW</a> | -40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads;<br>body width 4.4 mm | <a href="#">SOT403-1</a> |

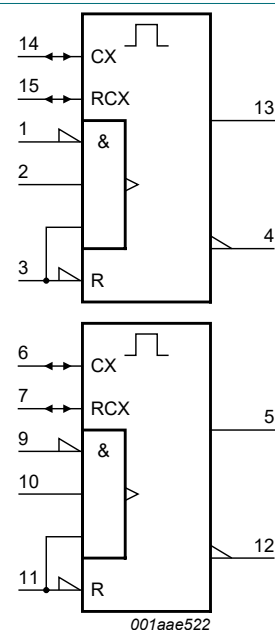
## Dual retriggerable monostable multivibrator with reset

| Type number               | Package           |          |                                                                                                                                |                          |
|---------------------------|-------------------|----------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                           | Temperature range | Name     | Description                                                                                                                    | Version                  |
| <a href="#">74LV123BQ</a> | -40 °C to +125 °C | DHVQFN16 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm | <a href="#">SOT763-1</a> |

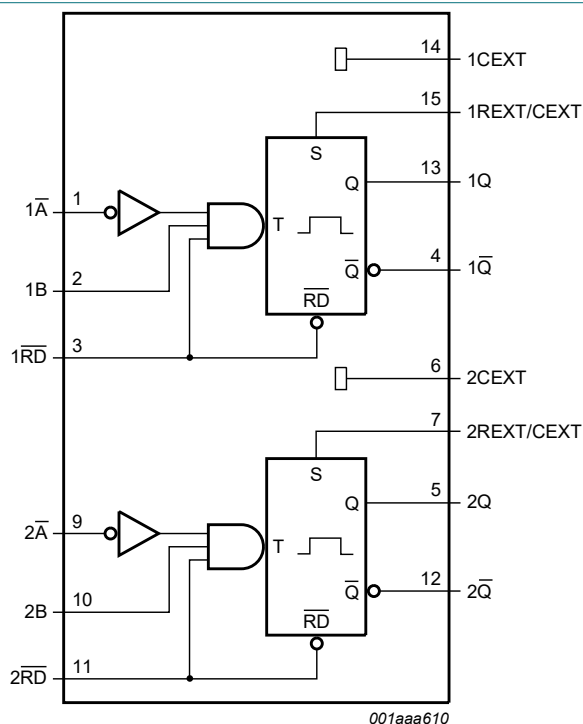
#### 4. Functional diagram



**Fig. 1. Logic symbol**



**Fig. 2. IEC logic symbol**



**Fig. 3. Functional diagram**

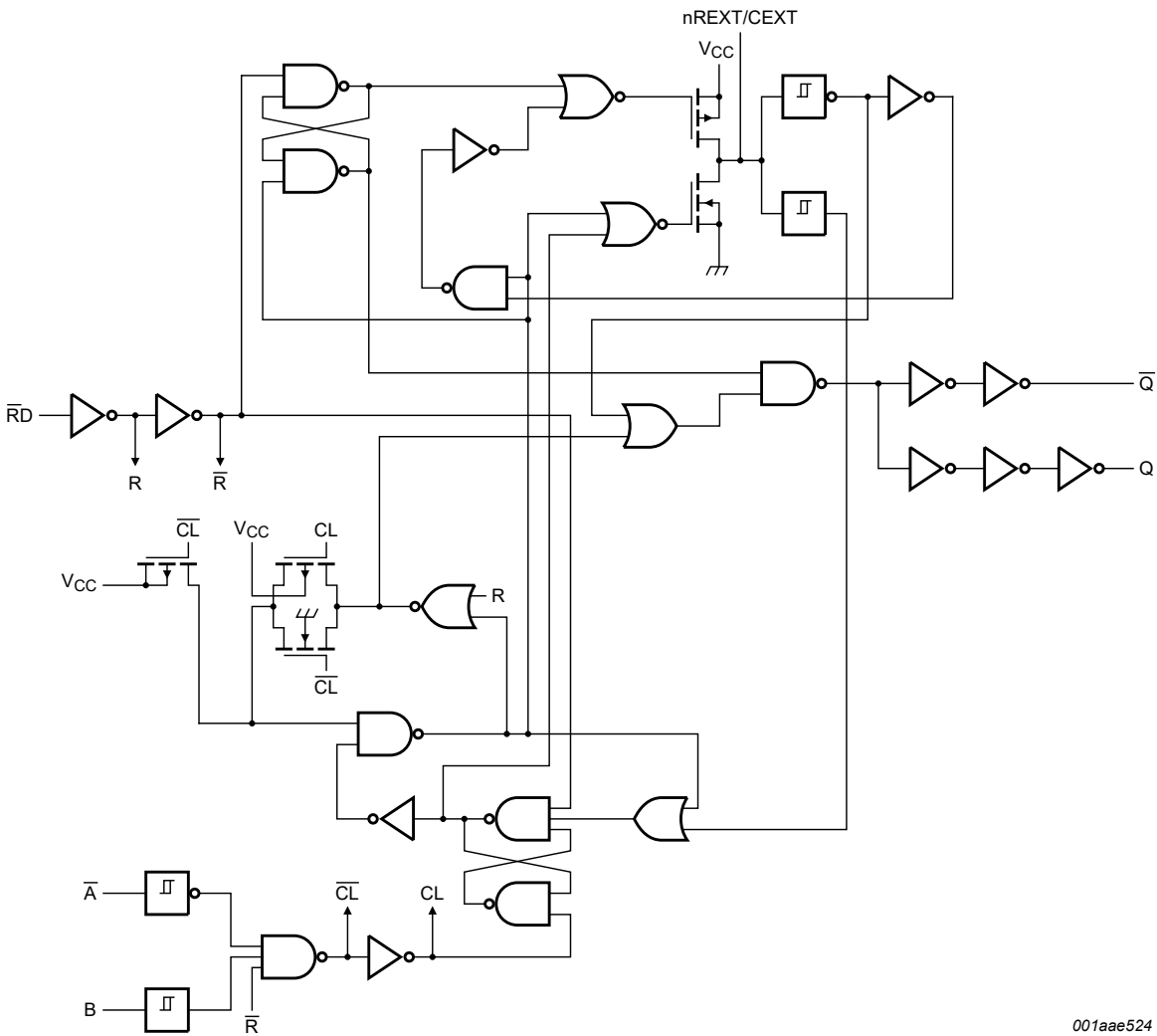
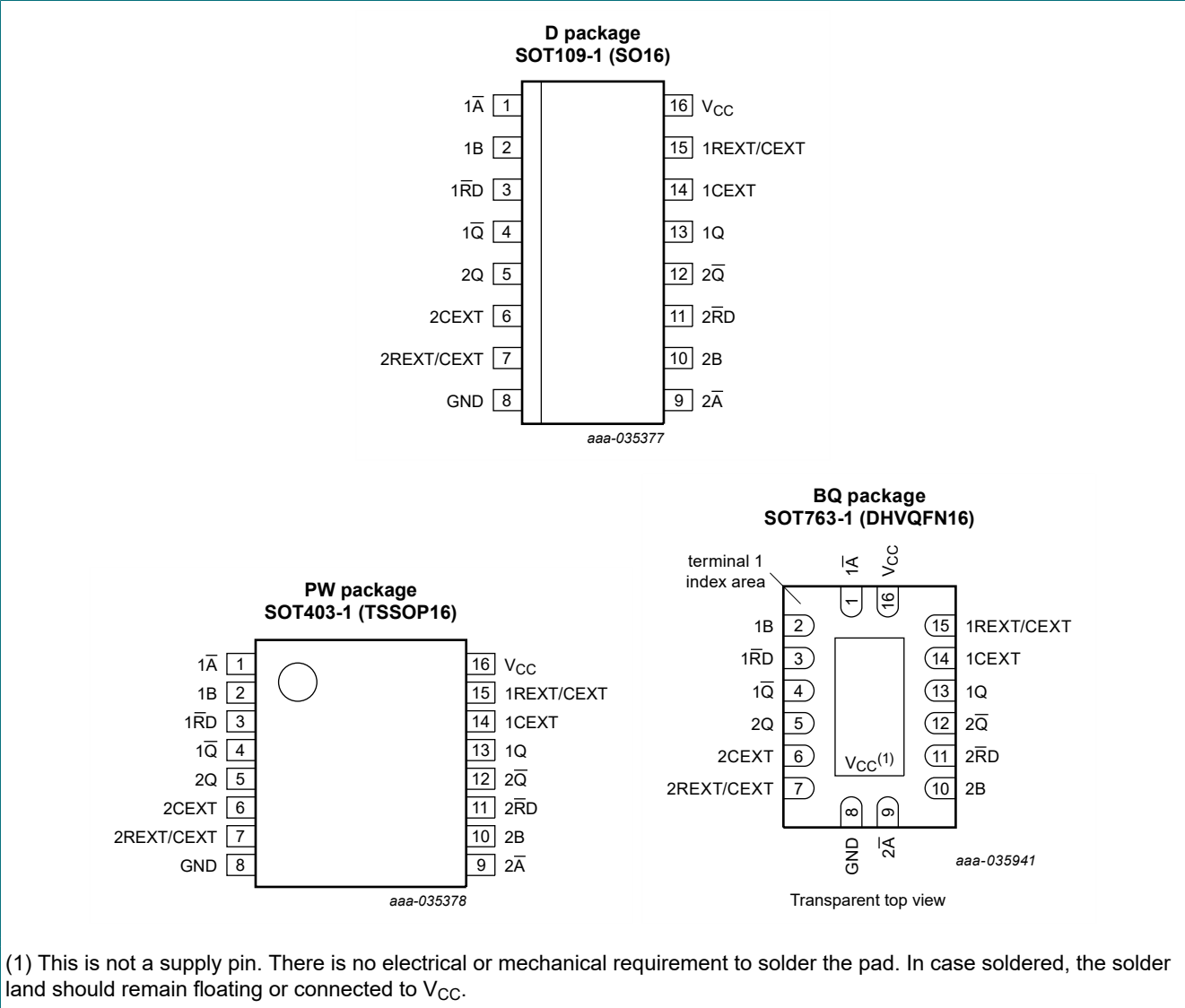


Fig. 4. Logic diagram

5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

| Symbol     | Pin | Description                                          |
|------------|-----|------------------------------------------------------|
| 1A         | 1   | negative-edge triggered input 1                      |
| 1B         | 2   | positive-edge triggered input 1                      |
| 1RD        | 3   | direct reset LOW and positive-edge triggered input 1 |
| 1Q         | 4   | active LOW output 1                                  |
| 2Q         | 5   | active HIGH output 2                                 |
| 2CEXT      | 6   | external capacitor connection 2                      |
| 2REXT/CEXT | 7   | external resistor and capacitor connection 2         |

| Symbol          | Pin | Description                                          |
|-----------------|-----|------------------------------------------------------|
| GND             | 8   | ground (0 V)                                         |
| 2A              | 9   | negative-edge triggered input 2                      |
| 2B              | 10  | positive-edge triggered input 2                      |
| 2RD             | 11  | direct reset LOW and positive-edge triggered input 2 |
| 2Q              | 12  | active LOW output 2                                  |
| 1Q              | 13  | active HIGH output 1                                 |
| 1CEXT           | 14  | external capacitor connection 1                      |
| 1REXT/CEXT      | 15  | external resistor and capacitor connection 1         |
| V <sub>CC</sub> | 16  | supply voltage                                       |

6. Functional description

Table 3. Function table

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

| Input |    |    | Output                                                                                |                                                                                       |
|-------|----|----|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| nRD   | nA | nB | nQ                                                                                    | nQ                                                                                    |
| L     | X  | X  | L                                                                                     | H                                                                                     |
| X     | H  | X  | L [1]                                                                                 | H [1]                                                                                 |
| X     | X  | L  | L [1]                                                                                 | H [1]                                                                                 |
| H     | L  | ↑  |  |  |
| H     | ↓  | H  |  |  |
| ↑     | L  | H  |  |  |

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

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol           | Parameter               | Conditions                                                                              | Min  | Max  | Unit |
|------------------|-------------------------|-----------------------------------------------------------------------------------------|------|------|------|
| V <sub>CC</sub>  | supply voltage          |                                                                                         | -0.5 | +7   | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V [1]                 | -    | ±20  | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V [1]                 | -    | ±50  | mA   |
| I <sub>O</sub>   | output current          | except for pins nREXT/CEXT;<br>V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V) [1] | -    | ±25  | mA   |
| I <sub>CC</sub>  | supply current          |                                                                                         | -    | +50  | mA   |
| I <sub>GND</sub> | ground current          |                                                                                         | -50  | -    | mA   |
| T <sub>stg</sub> | storage temperature     |                                                                                         | -65  | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C [2]                                                | -    | 500  | mW   |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
[2] For SOT109-1 (SO16) package: P<sub>tot</sub> derates linearly with 12.4 mW/K above 110 °C.  
For SOT403-1 (TSSOP16) package: P<sub>tot</sub> derates linearly with 8.5 mW/K above 91 °C.  
For SOT763-1 (DHVQFN16) package: P<sub>tot</sub> derates linearly with 11.2 mW/K above 106 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol           | Parameter                           | Conditions                           | Min | Typ | Max             | Unit |
|------------------|-------------------------------------|--------------------------------------|-----|-----|-----------------|------|
| V <sub>CC</sub>  | supply voltage                      | [1]                                  | 1.0 | 3.3 | 5.5             | V    |
| V <sub>I</sub>   | input voltage                       |                                      | 0   | -   | V <sub>CC</sub> | V    |
| V <sub>O</sub>   | output voltage                      |                                      | 0   | -   | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 | in free air                          | -40 | +25 | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 1.0 V to 2.0 V [2] | -   | -   | 500             | ns/V |
|                  |                                     | V <sub>CC</sub> = 2.0 V to 2.7 V [2] | -   | -   | 200             | ns/V |
|                  |                                     | V <sub>CC</sub> = 2.7 V to 3.6 V [2] | -   | -   | 100             | ns/V |
|                  |                                     | V <sub>CC</sub> = 3.6 V to 5.5 V [2] | -   | -   | 50              | ns/V |

- [1] The 74LV123 is guaranteed to function down to V<sub>CC</sub> = 1.0 V (input levels GND or V<sub>CC</sub>); The "Static characteristics" [Section 9](#) are guaranteed from V<sub>CC</sub> = 1.2 V to V<sub>CC</sub> = 5.5 V.
- [2] Except for Schmitt-trigger inputs nA and nB.

9. Static characteristics

Table 6. Static characteristics

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

| Symbol                              | Parameter                 | Conditions                                          | Min                | Typ[1] | Max                | Unit |
|-------------------------------------|---------------------------|-----------------------------------------------------|--------------------|--------|--------------------|------|
| T <sub>amb</sub> = -40 °C to +85 °C |                           |                                                     |                    |        |                    |      |
| V <sub>IH</sub>                     | HIGH-level input voltage  | V <sub>CC</sub> = 1.2 V                             | 0.9                | -      | -                  | V    |
|                                     |                           | V <sub>CC</sub> = 2.0 V                             | 1.4                | -      | -                  | V    |
|                                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                    | 2.0                | -      | -                  | V    |
|                                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V                    | 0.7V <sub>CC</sub> | -      | -                  | V    |
| V <sub>IL</sub>                     | LOW-level input voltage   | V <sub>CC</sub> = 1.2 V                             | -                  | -      | 0.3                | V    |
|                                     |                           | V <sub>CC</sub> = 2.0 V                             | -                  | -      | 0.6                | V    |
|                                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                    | -                  | -      | 0.8                | V    |
|                                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V                    | -                  | -      | 0.3V <sub>CC</sub> | V    |
| V <sub>OH</sub>                     | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> |                    |        |                    |      |
|                                     |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 1.2 V   | -                  | 1.2    | -                  | V    |
|                                     |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 2.0 V   | 1.8                | 2.0    | -                  | V    |
|                                     |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 2.7 V   | 2.5                | 2.7    | -                  | V    |
|                                     |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 3.0 V   | 2.8                | 3.0    | -                  | V    |
|                                     |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 4.5 V   | 4.3                | 4.5    | -                  | V    |
|                                     |                           | I <sub>O</sub> = -6 mA; V <sub>CC</sub> = 3.0 V     | 2.40               | 2.82   | -                  | V    |
|                                     |                           | I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 4.5 V    | 3.60               | 4.20   | -                  | V    |

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| Symbol                               | Parameter                 | Conditions                                                                             | Min                | Typ[1] | Max                | Unit |
|--------------------------------------|---------------------------|----------------------------------------------------------------------------------------|--------------------|--------|--------------------|------|
| V <sub>OL</sub>                      | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |                    |        |                    |      |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 1.2 V                                       | -                  | 0      | -                  | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 2.0 V                                       | -                  | 0      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 2.7 V                                       | -                  | 0      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 3.0 V                                       | -                  | 0      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 4.5 V                                       | -                  | 0      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 6 mA; V <sub>CC</sub> = 3.0 V                                         | -                  | 0.25   | 0.40               | V    |
|                                      |                           | I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 4.5 V                                        | -                  | 0.35   | 0.55               | V    |
| I <sub>I</sub>                       | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                       | -                  | -      | 1.0                | µA   |
| I <sub>CC</sub>                      | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -                  | -      | 20.0               | µA   |
| ΔI <sub>CC</sub>                     | additional supply current | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>CC</sub> = 2.7 V to 3.6 V             | -                  | -      | 500                | µA   |
| C <sub>I</sub>                       | input capacitance         |                                                                                        | -                  | 3.5    | -                  | pF   |
| T <sub>amb</sub> = -40 °C to +125 °C |                           |                                                                                        |                    |        |                    |      |
| V <sub>IH</sub>                      | HIGH-level input voltage  | V <sub>CC</sub> = 1.2 V                                                                | 0.9                | -      | -                  | V    |
|                                      |                           | V <sub>CC</sub> = 2.0 V                                                                | 1.4                | -      | -                  | V    |
|                                      |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                                       | 2.0                | -      | -                  | V    |
|                                      |                           | V <sub>CC</sub> = 4.5 V to 5.5 V                                                       | 0.7V <sub>CC</sub> | -      | -                  | V    |
| V <sub>IL</sub>                      | LOW-level input voltage   | V <sub>CC</sub> = 1.2 V                                                                | -                  | -      | 0.3                | V    |
|                                      |                           | V <sub>CC</sub> = 2.0 V                                                                | -                  | -      | 0.6                | V    |
|                                      |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                                       | -                  | -      | 0.8                | V    |
|                                      |                           | V <sub>CC</sub> = 4.5 V to 5.5 V                                                       | -                  | -      | 0.3V <sub>CC</sub> | V    |
| V <sub>OH</sub>                      | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |                    |        |                    |      |
|                                      |                           | I <sub>O</sub> = -100 µA; V <sub>CC</sub> = 1.2 V                                      | -                  | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -100 µA; V <sub>CC</sub> = 2.0 V                                      | 1.8                | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -100 µA; V <sub>CC</sub> = 2.7 V                                      | 2.5                | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -100 µA; V <sub>CC</sub> = 3.0 V                                      | 2.8                | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -100 µA; V <sub>CC</sub> = 4.5 V                                      | 4.3                | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -6 mA; V <sub>CC</sub> = 3.0 V                                        | 2.2                | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 4.5 V                                       | 3.5                | -      | -                  | V    |
| V <sub>OL</sub>                      | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |                    |        |                    |      |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 1.2 V                                       | -                  | -      | -                  | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 2.0 V                                       | -                  | -      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 2.7 V                                       | -                  | -      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 3.0 V                                       | -                  | -      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 100 µA; V <sub>CC</sub> = 4.5 V                                       | -                  | -      | 0.2                | V    |
|                                      |                           | I <sub>O</sub> = 6 mA; V <sub>CC</sub> = 3.0 V                                         | -                  | -      | 0.5                | V    |
|                                      |                           | I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 4.5 V                                        | -                  | -      | 0.65               | V    |
| I <sub>I</sub>                       | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                       | -                  | -      | 1.0                | µA   |
| I <sub>CC</sub>                      | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -                  | -      | 160                | µA   |
| ΔI <sub>CC</sub>                     | additional supply current | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>CC</sub> = 2.7 V to 3.6 V             | -                  | -      | 850                | µA   |

[1] All typical values are measured at T<sub>amb</sub> = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V;  $t_r = t_f \leq 2.5\text{ ns}$ ; for test circuit see Fig. 6.

| Symbol                                             | Parameter         | Conditions                                 | -40 °C to +85 °C |        |     | -40 °C to +125 °C |     | Unit |
|----------------------------------------------------|-------------------|--------------------------------------------|------------------|--------|-----|-------------------|-----|------|
|                                                    |                   |                                            | Min              | Typ[1] | Max | Min               | Max |      |
| Propagation delay; see <a href="#">Fig. 5</a>      |                   |                                            |                  |        |     |                   |     |      |
| t <sub>pd</sub>                                    | propagation delay | nRD, nA̅ and nB to nQ̅ <a href="#">[2]</a> |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 1.2 V                    | -                | 120    | -   | -                 | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | -                | 40     | 76  | -                 | 92  | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | -                | 30     | 56  | -                 | 68  | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | -                | 25     | 48  | -                 | 57  | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | -                | 18     | 40  | -                 | 46  | ns   |
|                                                    |                   | nRD to nQ (reset) <a href="#">[2]</a>      |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 1.2 V                    | -                | 100    | -   | -                 | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | -                | 30     | 57  | -                 | 68  | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | -                | 23     | 43  | -                 | 51  | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | -                | 20     | 38  | -                 | 45  | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | -                | 14     | 31  | -                 | 36  | ns   |
| Inputs nA̅, nB and nRD; see <a href="#">Fig. 5</a> |                   |                                            |                  |        |     |                   |     |      |
| t <sub>w</sub>                                     | pulse width       | nA̅ = LOW                                  |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | 30               | 5      | -   | 40                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | 25               | 3.5    | -   | 30                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | 20               | 3.0    | -   | 25                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | 15               | 2.5    | -   | 20                | -   | ns   |
|                                                    |                   | nB = HIGH                                  |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | 30               | 13     | -   | 40                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | 25               | 8      | -   | 30                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | 20               | 7      | -   | 25                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | 15               | 5      | -   | 20                | -   | ns   |
|                                                    |                   | nRD = LOW; see <a href="#">Fig. 11</a>     |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | 35               | 6      | -   | 45                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | 30               | 5      | -   | 40                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | 25               | 4      | -   | 30                | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | 20               | 3      | -   | 25                | -   | ns   |
| t <sub>trig</sub>                                  | retrigger time    | nB to nA̅; see <a href="#">Fig. 10</a>     |                  |        |     |                   |     |      |
|                                                    |                   | V <sub>CC</sub> = 2.0 V                    | -                | 70     | -   | -                 | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 2.7 V                    | -                | 55     | -   | -                 | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 3.0 V to 3.6 V           | -                | 45     | -   | -                 | -   | ns   |
|                                                    |                   | V <sub>CC</sub> = 4.5 V to 5.5 V           | -                | 40     | -   | -                 | -   | ns   |



Dual retriggerable monostable multivibrator with reset

| Symbol                                       | Parameter                     | Conditions                                                           | -40 °C to +85 °C |        |      | -40 °C to +125 °C |     | Unit |
|----------------------------------------------|-------------------------------|----------------------------------------------------------------------|------------------|--------|------|-------------------|-----|------|
|                                              |                               |                                                                      | Min              | Typ[1] | Max  | Min               | Max |      |
| Outputs; nQ̅ = LOW and nQ = HIGH, see Fig. 5 |                               |                                                                      |                  |        |      |                   |     |      |
| t <sub>W</sub>                               | pulse width                   | C <sub>EXT</sub> = 100 nF; R <sub>EXT</sub> = 10 kΩ                  |                  |        |      |                   |     |      |
|                                              |                               | V <sub>CC</sub> = 2.0 V                                              | -                | 470    | -    | -                 | -   | µs   |
|                                              |                               | V <sub>CC</sub> = 2.7 V                                              | -                | 460    | -    | -                 | -   | µs   |
|                                              |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | -                | 450    | -    | -                 | -   | µs   |
|                                              |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | -                | 430    | -    | -                 | -   | µs   |
|                                              |                               | C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ                     |                  |        |      |                   |     |      |
|                                              |                               | V <sub>CC</sub> = 2.0 V                                              | -                | 100    | -    | -                 | -   | ns   |
|                                              |                               | V <sub>CC</sub> = 2.7 V                                              | -                | 90     | -    | -                 | -   | ns   |
|                                              |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | -                | 80     | -    | -                 | -   | ns   |
|                                              |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | -                | 70     | -    | -                 | -   | ns   |
| External components                          |                               |                                                                      |                  |        |      |                   |     |      |
| R <sub>EXT</sub>                             | external resistance           | see Fig. 9 [3]                                                       |                  |        |      |                   |     |      |
|                                              |                               | V <sub>CC</sub> = 1.2 V                                              | 10               | -      | 1000 | -                 | -   | kΩ   |
|                                              |                               | V <sub>CC</sub> = 2.0 V                                              | 5                | -      | 1000 | -                 | -   | kΩ   |
|                                              |                               | V <sub>CC</sub> = 2.7 V                                              | 3                | -      | 1000 | -                 | -   | kΩ   |
|                                              |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | 2                | -      | 1000 | -                 | -   | kΩ   |
|                                              |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | 2                | -      | 1000 | -                 | -   | kΩ   |
| C <sub>EXT</sub>                             | external capacitance          | see Fig. 9 [3] [4]                                                   |                  |        |      |                   |     |      |
|                                              |                               | V <sub>CC</sub> = 1.2 V                                              | -                | -      | -    | -                 | -   | pF   |
|                                              |                               | V <sub>CC</sub> = 2.0 V                                              | -                | -      | -    | -                 | -   | pF   |
|                                              |                               | V <sub>CC</sub> = 2.7 V                                              | -                | -      | -    | -                 | -   | pF   |
|                                              |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                     | -                | -      | -    | -                 | -   | pF   |
|                                              |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                     | -                | -      | -    | -                 | -   | pF   |
| Dynamic power dissipation                    |                               |                                                                      |                  |        |      |                   |     |      |
| C <sub>PD</sub>                              | power dissipation capacitance | V <sub>CC</sub> = 3.3 V; V <sub>I</sub> = GND to V <sub>CC</sub> [5] | -                | 60     | -    | -                 | -   | pF   |

[1] All typical values are measured at T<sub>amb</sub> = 25 °C and nominal supply values (V<sub>CC</sub> = 3.3 V and 5.0 V).

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>; C<sub>EXT</sub> = 0 pF; R<sub>EXT</sub> = 5 kΩ.

[3] For other R<sub>EXT</sub> and C<sub>EXT</sub> combinations see Fig. 9 and Section 11.1.1.

[4] C<sub>EXT</sub> has no limits.

[5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in µW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

10.1. Waveforms and test circuit

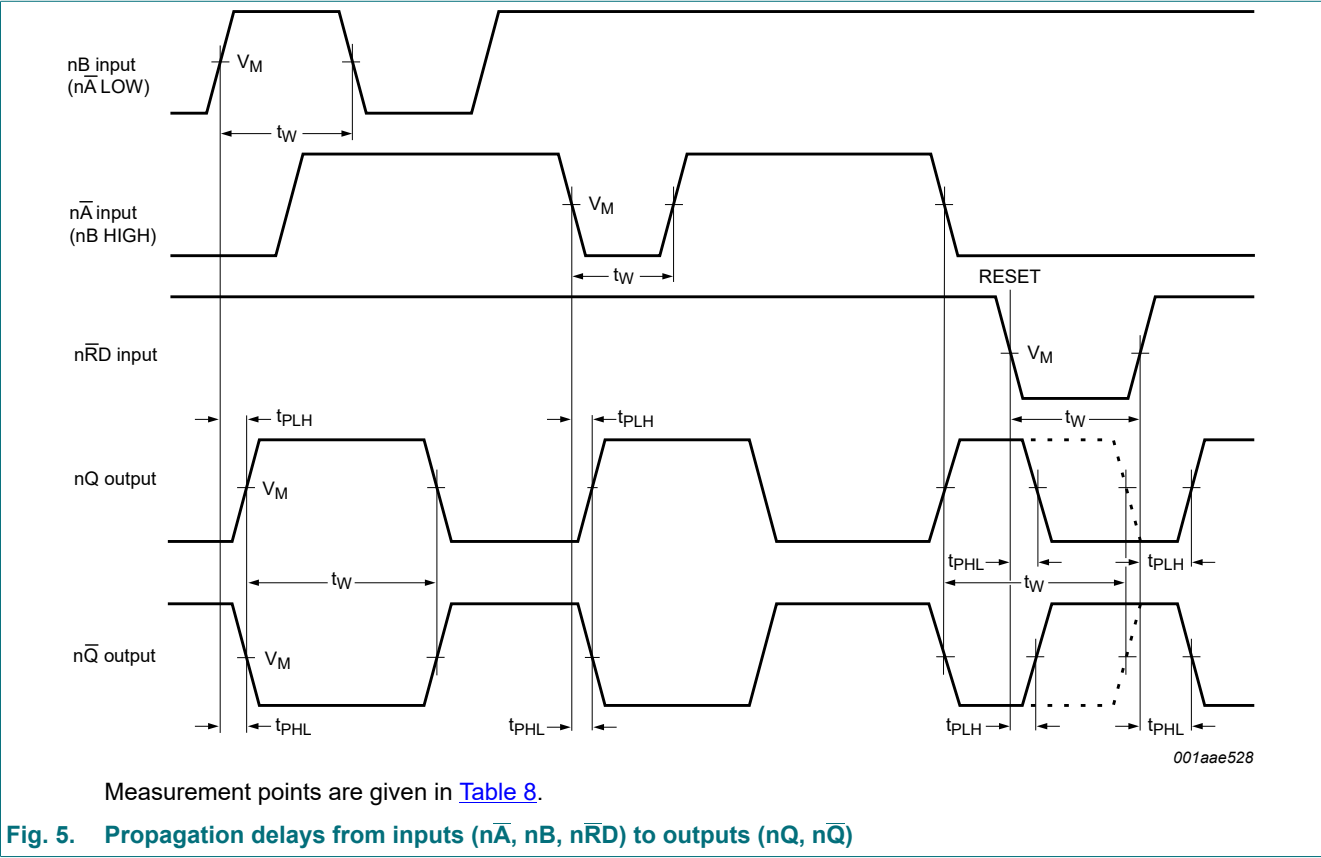


Table 8. Measurement points

| $V_{CC}$            | $V_M$               |
|---------------------|---------------------|
| $\geq 2.7\text{ V}$ | 1.5 V               |
| $< 2.7\text{ V}$    | $0.5 \times V_{CC}$ |

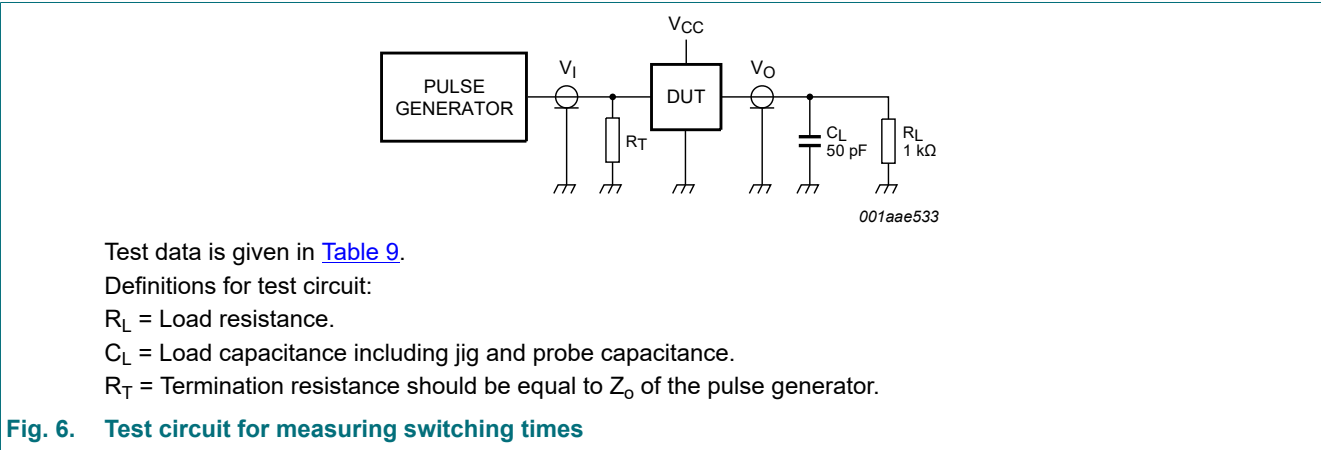


Table 9. Test data

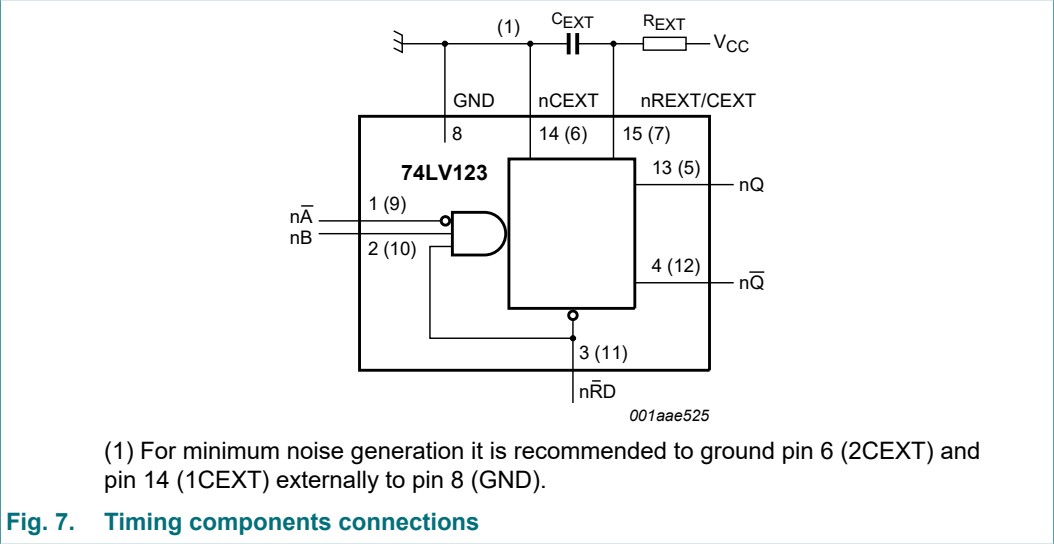
| Supply voltage  | Input           |                                 | Load           |                | Test                                |
|-----------------|-----------------|---------------------------------|----------------|----------------|-------------------------------------|
| V <sub>CC</sub> | V <sub>I</sub>  | t <sub>r</sub> , t <sub>f</sub> | C <sub>L</sub> | R <sub>L</sub> |                                     |
| < 2.7 V         | V <sub>CC</sub> | ≤ 2.5 ns                        | 50 pF          | 1 kΩ           | t <sub>PHL</sub> , t <sub>PLH</sub> |
| 2.7 V to 3.6 V  | 2.7 V           | ≤ 2.5 ns                        | 50 pF          | 1 kΩ           | t <sub>PHL</sub> , t <sub>PLH</sub> |
| ≥ 4.5 V         | V <sub>CC</sub> | ≤ 2.5 ns                        | 50 pF          | 1 kΩ           | t <sub>PHL</sub> , t <sub>PLH</sub> |

11. Application information

11.1. Timing components

11.1.1. Basic timing

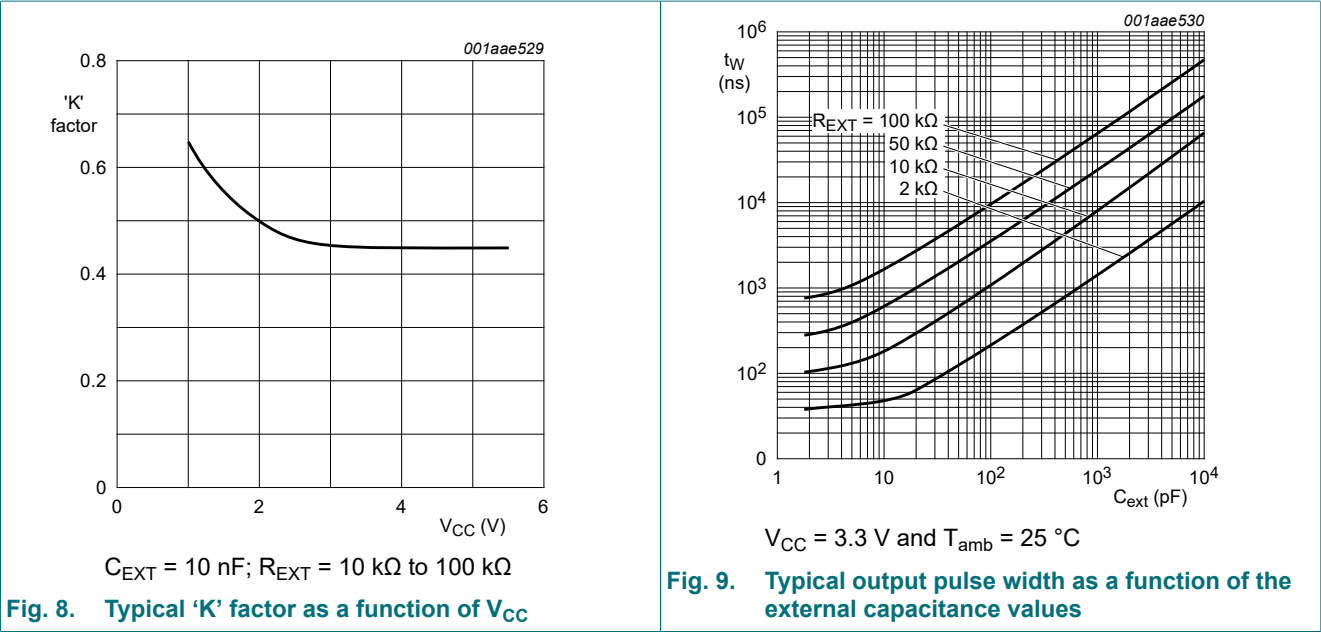
The basic output pulse width is essentially determined by the values of the external timing components R<sub>EXT</sub> and C<sub>EXT</sub>.



If C<sub>EXT</sub> > 10 nF, the following formula is valid: t<sub>W</sub> = K x R<sub>EXT</sub> x C<sub>EXT</sub> (typical) where:

- t<sub>W</sub> = output pulse width in ns
- R<sub>EXT</sub> = external resistor in kΩ
- C<sub>EXT</sub> = external capacitor in pF
- K = constant: this is 0.45 for V<sub>CC</sub> = 5.0 V and 0.48 for V<sub>CC</sub> = 2.0 V (see Fig. 8)

The inherent test jig and pin capacitance at pin 15 and pin 7 (nREXT/CEXT) is approximately 7 pF.



11.1.2. Retrigger timing

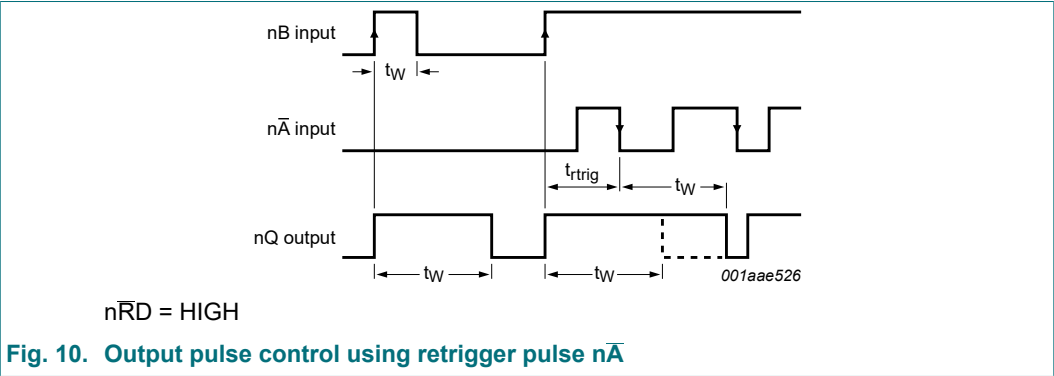
The time to retrigger the monostable multivibrator depends on the values of  $R_{EXT}$  and  $C_{EXT}$ . The output pulse width will only be extended when the time between the active going edges of the trigger pulses meets the minimum retrigger time. If  $C_{EXT} > 10\text{ pF}$ , the next formula for the set-up time of a retrigger pulse is valid:

at  $V_{CC} = 5.0\text{ V}$ :  $t_{rtrig} = 30 + 0.19R_{EXT} \times C_{EXT}^{0.9} + 13 \times R_{EXT}^{1.05}$  (typical)

at  $V_{CC} = 3.0\text{ V}$ :  $t_{rtrig} = 41 + 0.15R_{EXT} \times C_{EXT}^{0.9} \times 1 \times R_{EXT}$  (typical)

where:

- $t_{rtrig}$  = retrigger time in ns
- $C_{EXT}$  = external capacitor in pF
- $R_{EXT}$  = external resistor in k $\Omega$



11.1.3. Reset timing

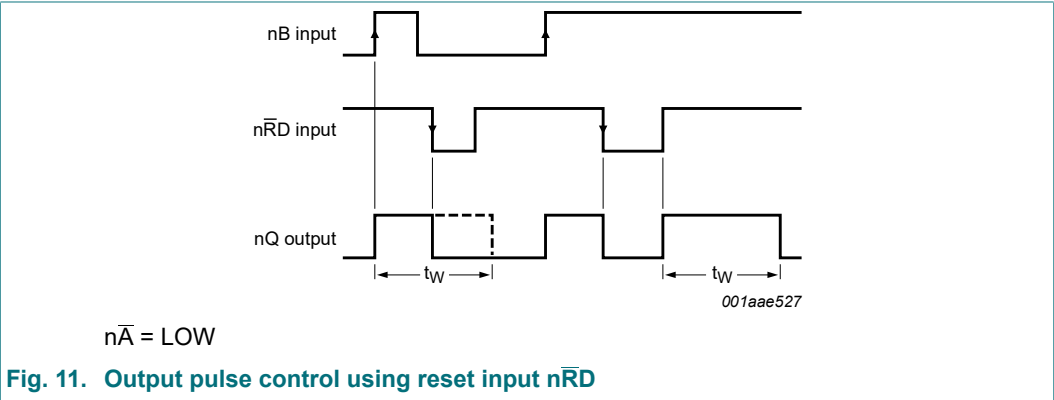


Fig. 11. Output pulse control using reset input  $n\bar{RD}$

11.2. Power considerations

11.2.1. Power-up

When the monostable multivibrator is powered-up, it may produce an output pulse with a pulse width defined by the values of  $R_{EXT}$  and  $C_{EXT}$ . This output pulse can be eliminated using the RC circuit on pin  $n\bar{RD}$  shown in Fig. 12.

11.2.2. Power-down

A large capacitor ( $C_{EXT}$ ) may cause problems when powering-down the monostable due to the energy stored in this capacitor. When a system containing this device is powered-down or a rapid decrease of  $V_{CC}$  to zero occurs, the monostable may sustain damage, due to the capacitor discharging through the input protection diodes. To avoid this possibility, connect a damping diode  $D_{EXT}$  (preferably a germanium or Schottky type diode) able to withstand large current surges. See Fig. 12.

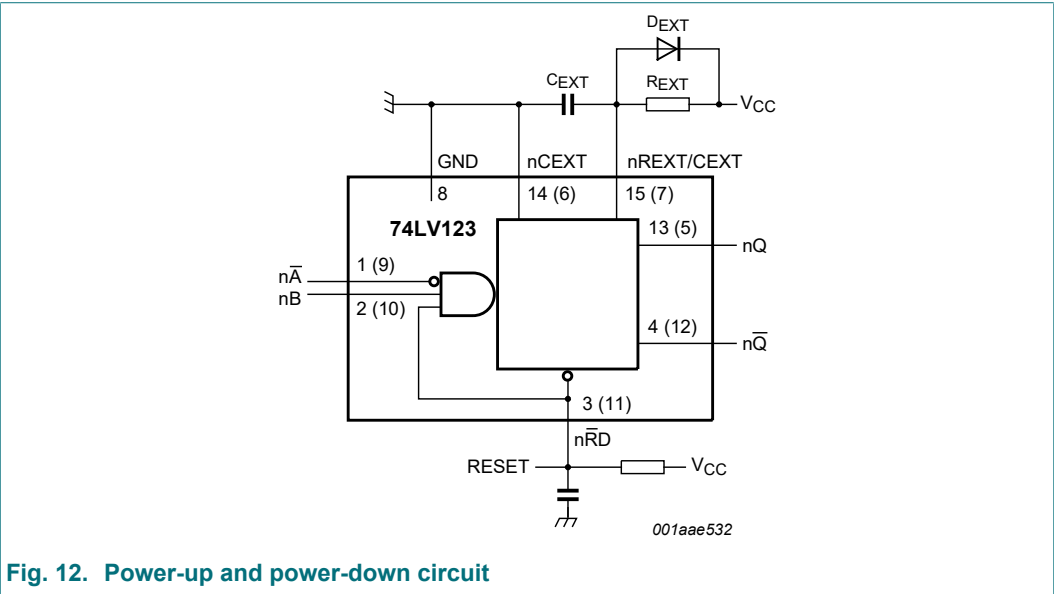


Fig. 12. Power-up and power-down circuit

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

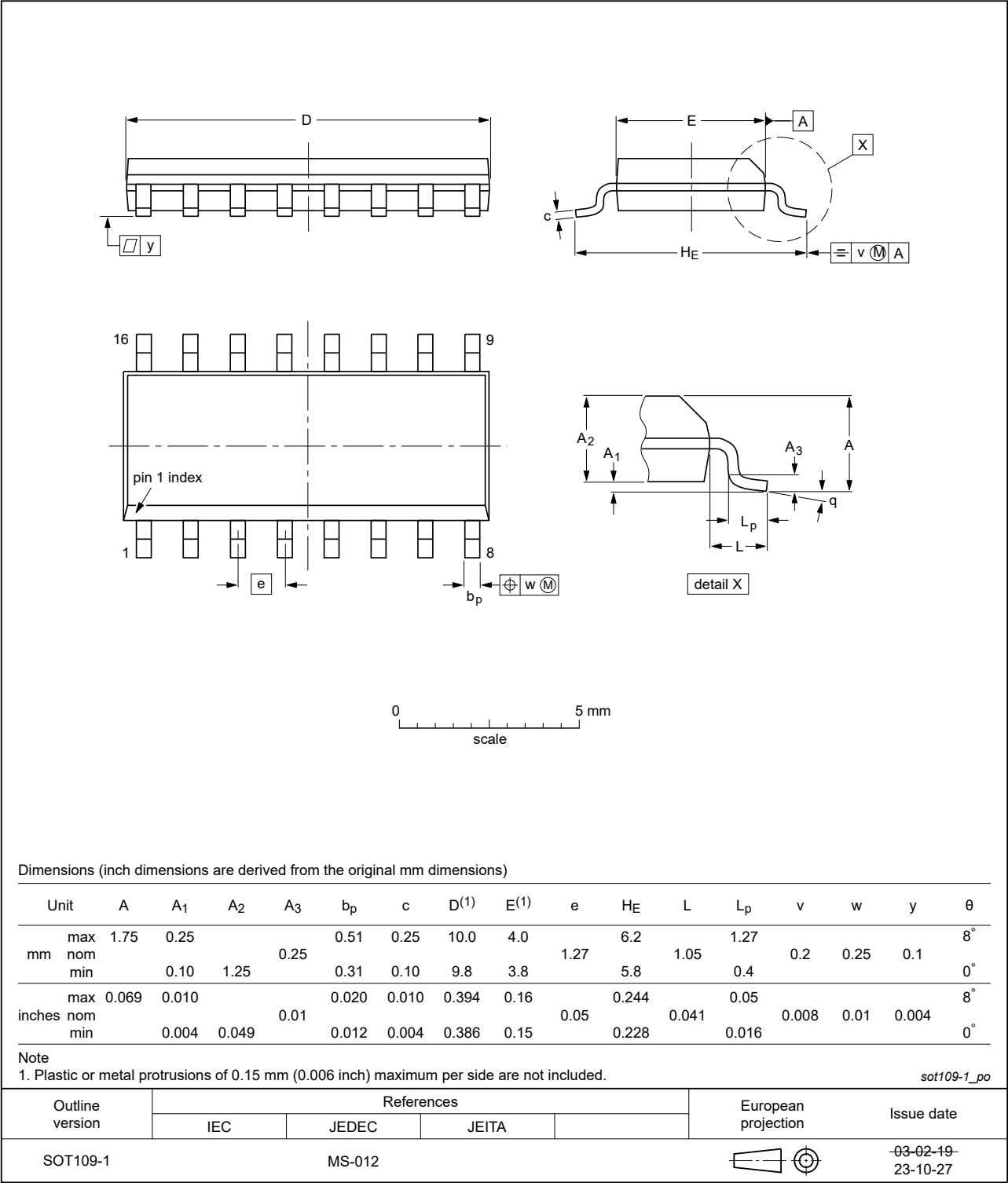


Fig. 13. Package outline SOT109-1 (SO16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

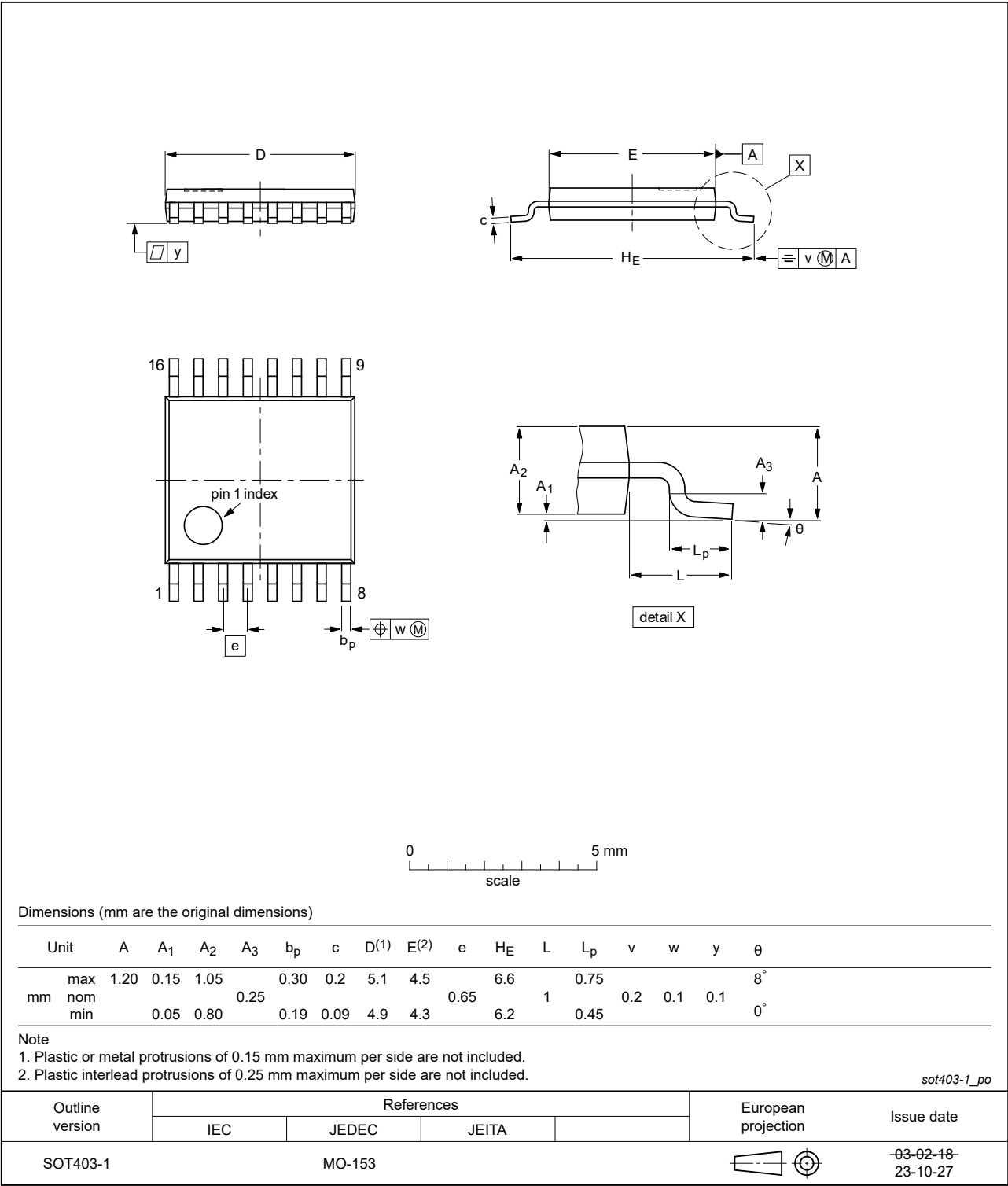


Fig. 14. Package outline SOT403-1 (TSSOP16)

DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads;  
16 terminals; body 2.5 x 3.5 x 0.85 mm

SOT763-1

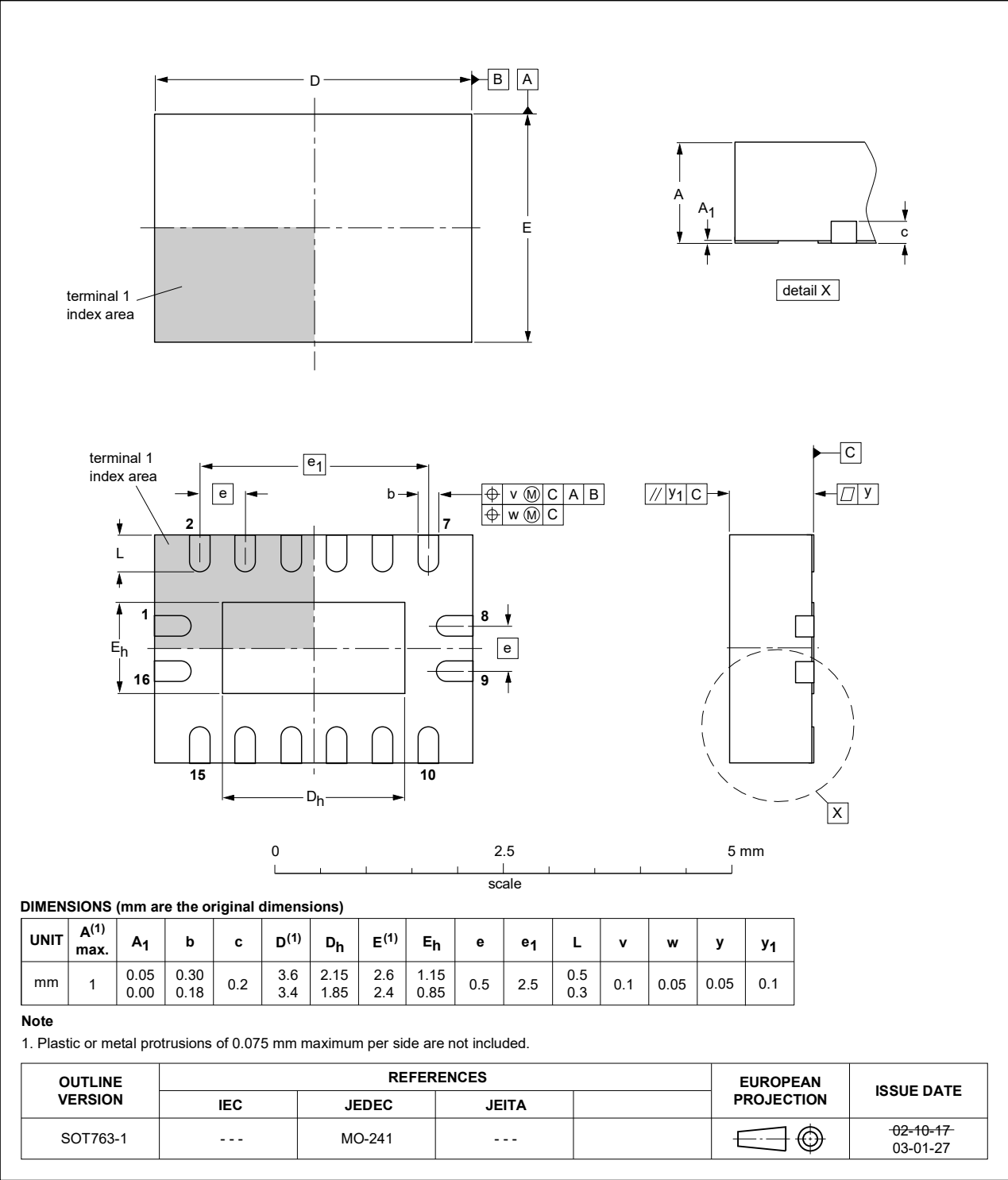


Fig. 15. Package outline SOT763-1 (DHVQFN16)



13. Abbreviations

Table 10. Abbreviations

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

14. Revision history

Table 11. Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                                                                                                                                                                                               | Data sheet status     | Change notice | Supersedes   |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|--------------|
| 74LV123 v.11   | 20240115                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.10 |
| Modifications: | <ul style="list-style-type: none"><li>Section 2: ESD specification updated according to the latest JEDEC standard.</li><li>Fig. 13 and Fig. 14: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153</li></ul>                                                                                                                                                                                                         |                       |               |              |
| 74LV123 v.10   | 20230714                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.9  |
| Modifications: | <ul style="list-style-type: none"><li>Section 10 updated (Errata).</li></ul>                                                                                                                                                                                                                                                                                                                                                               |                       |               |              |
| 74LV123 v.9    | 20210913                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.8  |
| Modifications: | <ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li><li>Type number 74LV123DB (SOT338-1/SSOP16) removed.</li><li>Section 1 and Section 2 updated.</li><li>Section 7: Derating values for P<sub>tot</sub> total power dissipation have been updated.</li></ul> |                       |               |              |
| 74LV123 v.8    | 20160304                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.7  |
| Modifications: | <ul style="list-style-type: none"><li>Type numbers 74LV123N (SOT38-4) removed.</li></ul>                                                                                                                                                                                                                                                                                                                                                   |                       |               |              |
| 74LV123 v.7    | 20111212                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.6  |
| Modifications: | <ul style="list-style-type: none"><li>Legal pages updated.</li></ul>                                                                                                                                                                                                                                                                                                                                                                       |                       |               |              |
| 74LV123 v.6    | 20110826                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.5  |
| 74LV123 v.5    | 20071108                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | 74LV123 v.4  |
| 74LV123 v.4    | 20070919                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | 74LV123 v.3  |
| 74LV123 v.3    | 20030313                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | 74LV123 v.2  |
| 74LV123 v.2    | 19980420                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | 74LV123 v.1  |
| 74LV123 v.1    | 19970204                                                                                                                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | -            |

## 15. Legal information

### Data sheet status

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

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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