

# 74HC123; 74HCT123

Dual retriggerable monostable multivibrator with reset

Rev. 11.1 — 3 September 2020

Product data sheet

## 1. General description

The 74HC123; 74HCT123 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  $n\bar{B}$ ). By repeating this process, the output pulse period ( $nQ = \text{HIGH}$ ,  $nQ = \text{LOW}$ ) can be made as long as desired. Alternatively, an output delay can be terminated at any time by a LOW-going edge on input  $n\bar{RD}$ . Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

Schmitt-trigger action in the  $n\bar{A}$  and  $n\bar{B}$  inputs, makes the circuit highly tolerant to slower input rise and fall times.

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Complies with JEDEC standards:
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- Input levels:
  - For 74HC123: CMOS level
  - For 74HCT123: TTL level
- 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 action on all inputs except for the reset input
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 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
74HC123D	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74HCT123D				
74HC123DB	-40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
74HCT123DB				
74HC123PW	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74HCT123PW				
74HC123BQ	-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	SOT763-1

4. Functional diagram

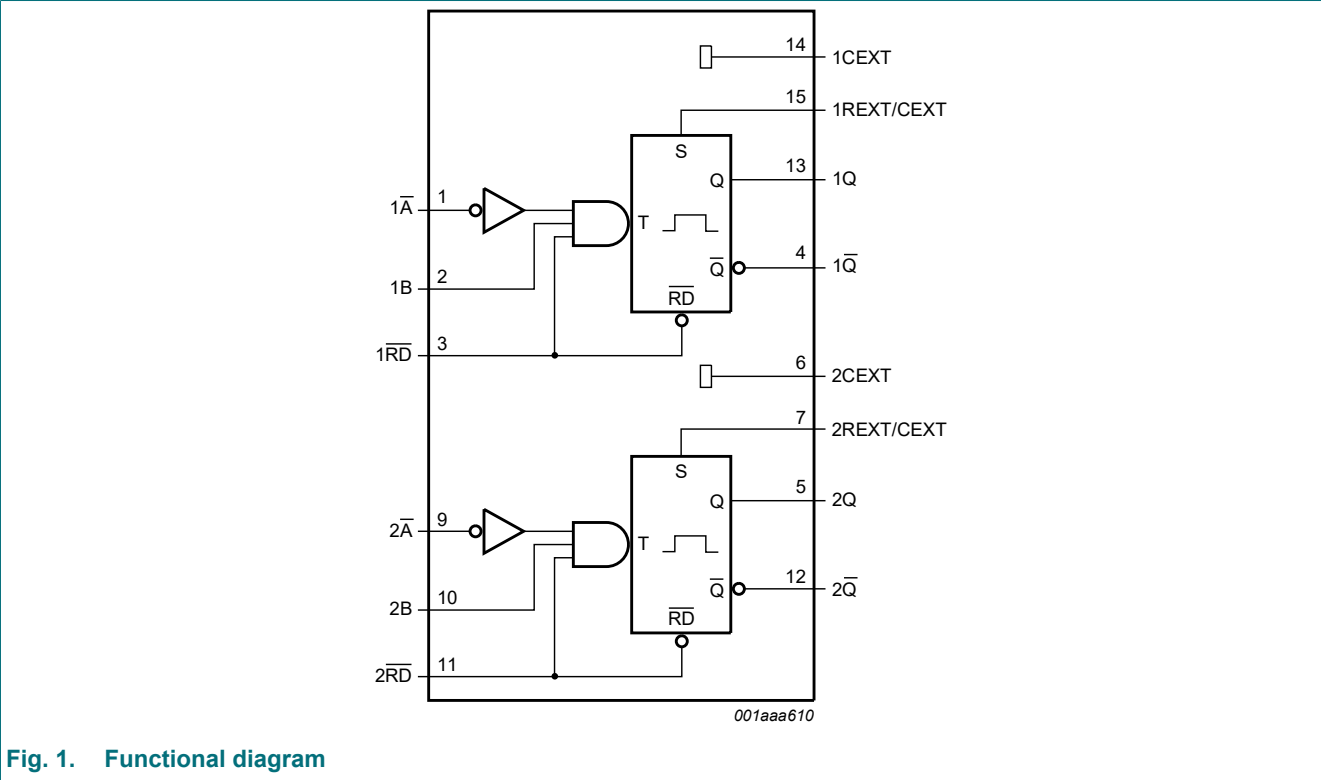


Fig. 1. Functional diagram

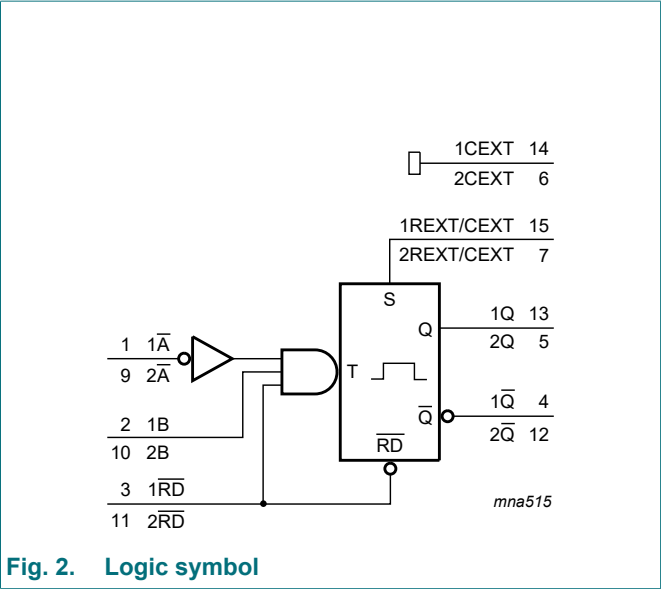


Fig. 2. Logic symbol

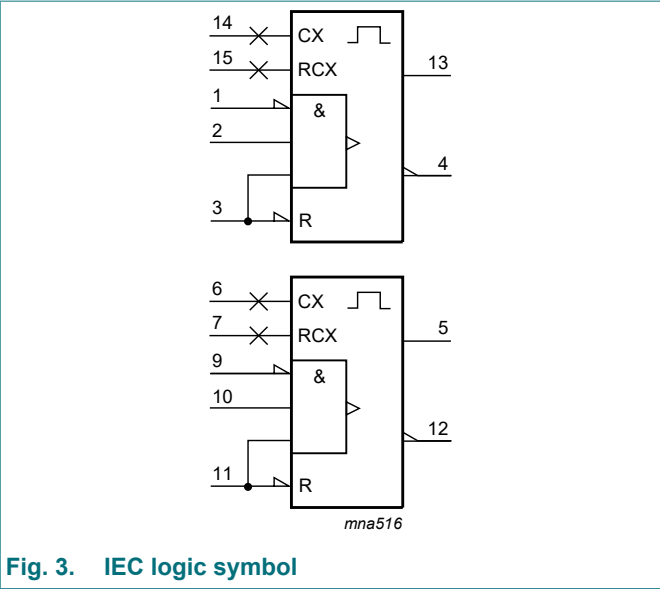


Fig. 3. IEC logic symbol

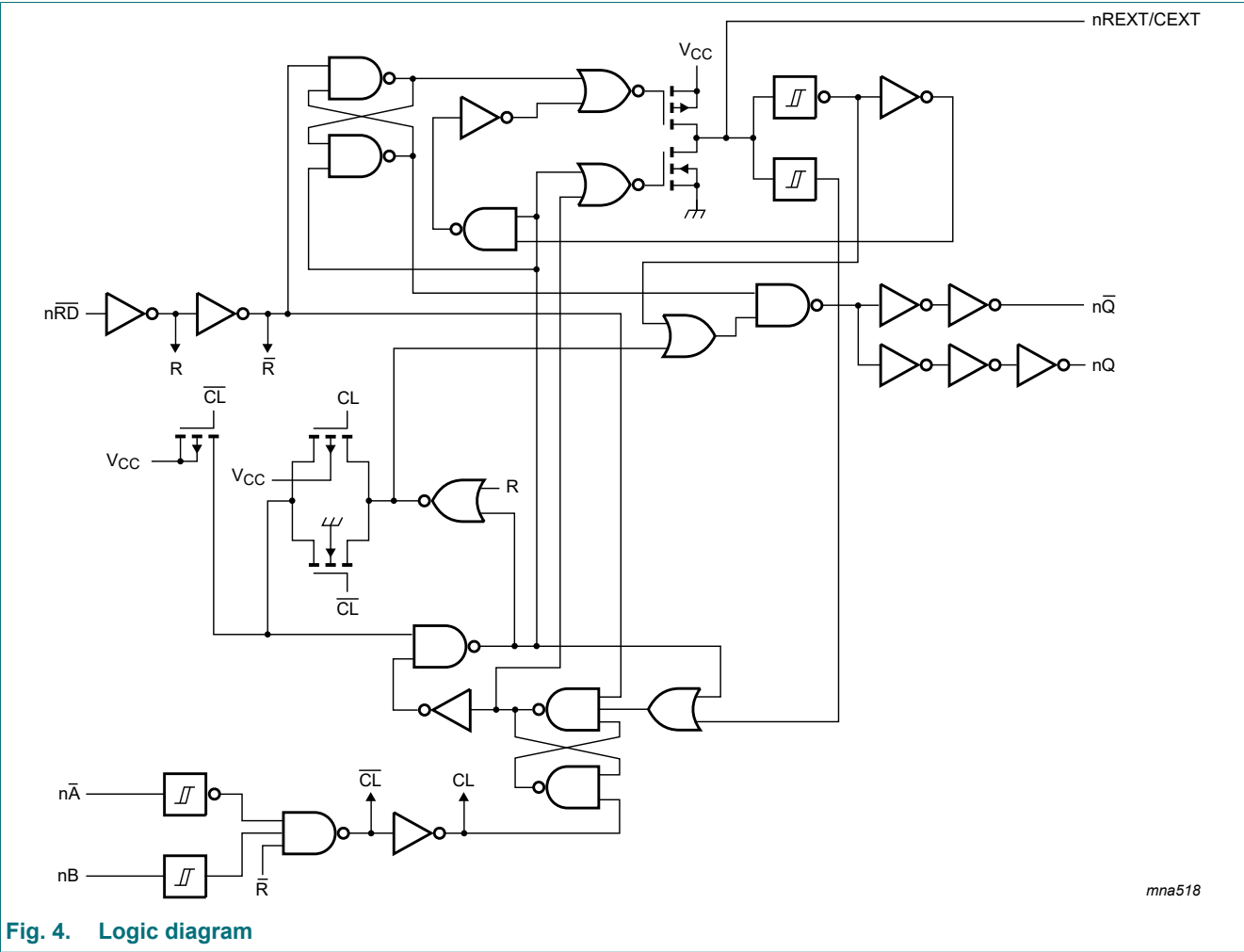


Fig. 4. Logic diagram

5. Pinning information

5.1. Pinning

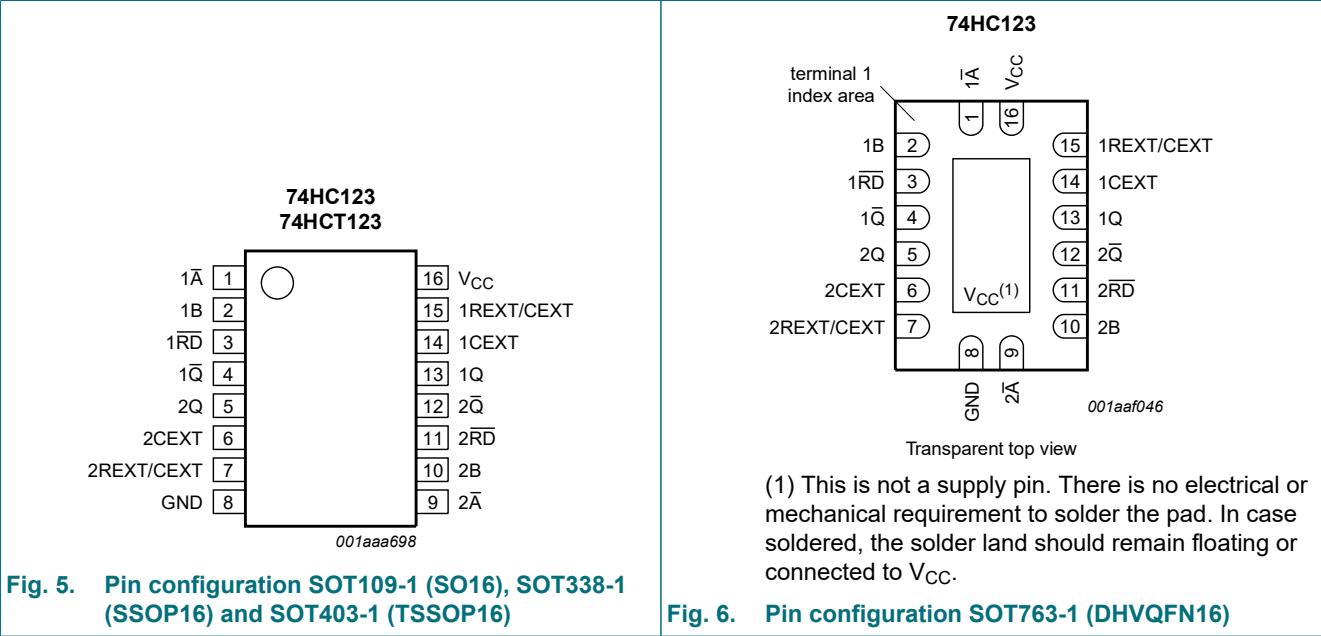


Fig. 5. Pin configuration SOT109-1 (SO16), SOT338-1 (SSOP16) and SOT403-1 (TSSOP16)

Fig. 6. Pin configuration SOT763-1 (DHVQFN16)



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
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
VCC	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 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	-	±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	-	±20	mA
I <sub>O</sub>	output current	except for pins nREXT/CEXT; V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)	-	±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	[1]	-	500	mW

- [1] For SOT109-1 (SO16) package: P<sub>tot</sub> derates linearly with 12.4 mW/K above 110 °C.  
 For SOT338-1 (SSOP16) package: P<sub>tot</sub> derates linearly with 8.5 mW/K above 91 °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	74HC123			74HCT123			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
$\Delta t/\Delta V$	input transition rise and fall rate	nRD input							
		V <sub>CC</sub> = 2.0 V	-	-	625	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V <sub>CC</sub> = 6.0 V	-	-	83	-	-	-	ns/V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C

## 9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC123										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	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> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	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> = 20 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.1	-	±1.0	-	±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> = 6.0 V	-	-	8.0	-	80	-	160	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF

## Dual retriggerable monostable multivibrator with reset

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HCT123										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	-	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = -20 µA	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -4 mA	3.98	4.32	-	3.84	-	3.7	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V								
		I <sub>O</sub> = 20 µA	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4.0 mA	-	0.15	0.26	-	0.33	-	0.4	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	-	-	±0.1	-	±1.0	-	±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	-	-	8.0	-	80	-	160	µA
ΔI <sub>CC</sub>	additional supply current	per input pin; I <sub>O</sub> = 0 A; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V								
		pins n $\overline{A}$ , nB	-	35	125	-	160	-	170	µA
		pin n $\overline{RD}$	-	50	180	-	225	-	245	µA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see Fig. 12.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
74HC123										
t <sub>pd</sub>	propagation delay	nRD, nA, nB to nQ or nQ; [1] C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 2.0 V	-	83	255	-	320	-	385	ns
		V <sub>CC</sub> = 4.5 V	-	30	51	-	64	-	77	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	26	-	-	-	-	-	ns
		V <sub>CC</sub> = 6.0 V	-	24	43	-	54	-	65	ns
		nRD (reset) to nQ or nQ; C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 2.0 V	-	66	215	-	270	-	325	ns
		V <sub>CC</sub> = 4.5 V	-	24	43	-	54	-	65	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	20	-	-	-	-	-	ns
		V <sub>CC</sub> = 6.0 V	-	19	37	-	46	-	55	ns
t <sub>t</sub>	transition time	see Fig. 9 [1]								
		V <sub>CC</sub> = 2.0 V	-	19	75	-	95	-	110	ns
		V <sub>CC</sub> = 4.5 V	-	7	15	-	19	-	22	ns
		V <sub>CC</sub> = 6.0 V	-	6	13	-	16	-	19	ns
t <sub>w</sub>	pulse width	nA LOW; see Fig. 10								
		V <sub>CC</sub> = 2.0 V	100	8	-	125	-	150	-	ns
		V <sub>CC</sub> = 4.5 V	20	3	-	25	-	30	-	ns
		V <sub>CC</sub> = 6.0 V	17	2	-	21	-	26	-	ns
		nB HIGH; see Fig. 10								
		V <sub>CC</sub> = 2.0 V	100	17	-	125	-	150	-	ns
		V <sub>CC</sub> = 4.5 V	20	6	-	25	-	30	-	ns
		V <sub>CC</sub> = 6.0 V	17	5	-	21	-	26	-	ns
		nRD LOW; see Fig. 11								
		V <sub>CC</sub> = 2.0 V	100	14	-	125	-	150	-	ns
		V <sub>CC</sub> = 4.5 V	20	5	-	25	-	30	-	ns
		V <sub>CC</sub> = 6.0 V	17	4	-	21	-	26	-	ns
		nQ HIGH and nQ LOW; [2] V <sub>CC</sub> = 5.0 V; see Fig. 10 and Fig. 11								
		C <sub>EXT</sub> = 100 nF; R <sub>EXT</sub> = 10 kΩ	-	450	-	-	-	-	-	μs
		C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ	-	75	-	-	-	-	-	ns
t <sub>trig</sub>	retrigger time	nA, nB; C <sub>EXT</sub> = 0 pF; [3] [4] R <sub>EXT</sub> = 5 kΩ; V <sub>CC</sub> = 5.0 V; see Fig. 10	-	110	-	-	-	-	-	ns



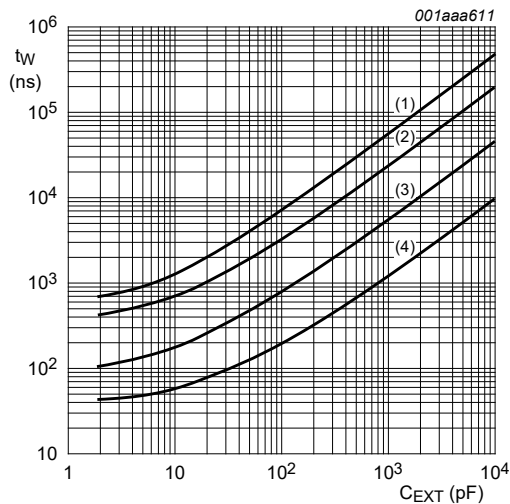
## Dual retriggerable monostable multivibrator with reset

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
R <sub>EXT</sub>	external timing resistor	see Fig. 7								
		V <sub>CC</sub> = 2.0 V	10	-	1000	-	-	-	-	kΩ
		V <sub>CC</sub> = 5.0 V	2	-	1000	-	-	-	-	kΩ
C <sub>EXT</sub>	external timing capacitor	V <sub>CC</sub> = 5.0 V; see Fig. 7 [4]	-	-	-	-	-	-	-	pF
C <sub>PD</sub>	power dissipation capacitance	per monostable; V <sub>I</sub> = GND to V <sub>CC</sub> [5]	-	54	-	-	-	-	-	pF
<b>74HCT123</b>										
t <sub>PHL</sub>	HIGH to LOW propagation delay	nRD, nA, nB to nQ or nQ; C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 4.5 V	-	30	51	-	64	-	77	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	26	-	-	-	-	-	ns
		nRD (reset) to nQ or nQ; C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 4.5 V	-	27	46	-	58	-	69	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	23	-	-	-	-	-	ns
t <sub>PLH</sub>	LOW to HIGH propagation delay	nRD, nA, nB to nQ or nQ; C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 4.5 V	-	28	51	-	64	-	77	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	26	-	-	-	-	-	ns
		nRD (reset) to nQ or nQ; C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ; see Fig. 9								
		V <sub>CC</sub> = 4.5 V	-	23	46	-	58	-	69	ns
		V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF	-	23	-	-	-	-	-	ns
t <sub>t</sub>	transition time	V <sub>CC</sub> = 4.5 V; see Fig. 9 [1]	-	7	15	-	19	-	22	ns
t <sub>w</sub>	pulse width	V <sub>CC</sub> = 4.5 V								
		nA LOW; see Fig. 10	20	3	-	25	-	30	-	ns
		nB HIGH; see Fig. 10	20	5	-	25	-	30	-	ns
		nRD LOW; see Fig. 11	20	7	-	25	-	30	-	ns
		nQ HIGH and nQ LOW; V <sub>CC</sub> = 5.0 V; see Fig. 10 and Fig. 11 [2]								
		C <sub>EXT</sub> = 100 nF; R <sub>EXT</sub> = 10 kΩ	-	450	-	-	-	-	-	μs
t <sub>trig</sub>	retrigger time	C <sub>EXT</sub> = 0 pF; R <sub>EXT</sub> = 5 kΩ	-	75	-	-	-	-	-	ns
		R <sub>EXT</sub> = 5 kΩ; V <sub>CC</sub> = 5.0 V; see Fig. 10 [3] [4]	-	110	-	-	-	-	-	ns
R <sub>EXT</sub>	external timing resistor	V <sub>CC</sub> = 5.0 V; see Fig. 7	2	-	1000	-	-	-	-	kΩ
C <sub>EXT</sub>	external timing capacitor	V <sub>CC</sub> = 5.0 V; see Fig. 7 [4]	-	-	-	-	-	-	-	pF

## Dual retriggerable monostable multivibrator with reset

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
C <sub>PD</sub>	power dissipation capacitance	per monostable; V <sub>I</sub> = GND to V <sub>CC</sub> - 1.5 V	-	56	-	-	-	-	-	pF

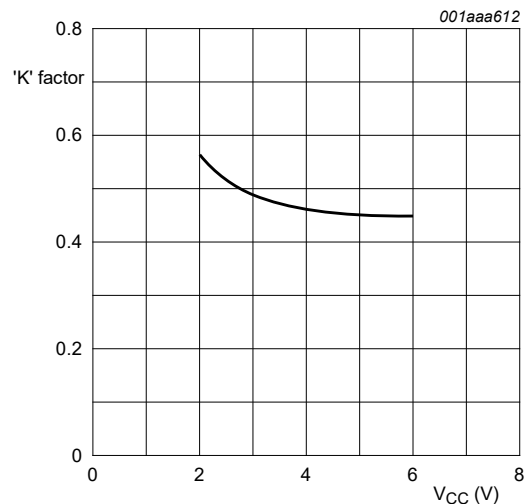
- [1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ ;  $t_i$  is the same as  $t_{THL}$  and  $t_{TLH}$
- [2] For other  $R_{EXT}$  and  $C_{EXT}$  combinations see Fig. 7. If  $C_{EXT} > 10$  nF, the next formula is valid:  
 $t_W = K \times R_{EXT} \times C_{EXT}$ , where:  
 $t_W$  = typical output pulse width in ns;  
 $R_{EXT}$  = external resistor in k $\Omega$ ;  
 $C_{EXT}$  = external capacitor in pF;  
 $K$  = constant = 0.45 for  $V_{CC} = 5.0$  V and 0.55 for  $V_{CC} = 2.0$  V.  
The inherent test jig and pin capacitance at pins 15 and 7 (n $R_{EXT}/C_{EXT}$ ) is approximately 7 pF.
- [3] 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 input pulses meets the minimum retrigger time. If  $C_{EXT} > 10$  pF, the next formula (at  $V_{CC} = 5.0$  V) for the setup time of a retrigger pulse is valid:  
 $t_{trig} = 30 + 0.19 \times R_{EXT} \times C_{EXT}^{0.9} + 13 \times R_{EXT}^{1.05}$ , where:  
 $t_{trig}$  = retrigger time in ns;  
 $C_{EXT}$  = external capacitor in pF;  $R_{EXT}$  = external resistor in k $\Omega$ .  
The inherent test jig and pin capacitance at pins 15 and 7 (n $R_{EXT}/C_{EXT}$ ) is 7 pF.
- [4] When the device is powered-up, initiate the device via a reset pulse, when  $C_{EXT} < 50$  pF.
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o) + 0.75 \times C_{EXT} \times V_{CC}^2 \times f_o + D \times 16 \times V_{CC}$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $D$  = duty factor in %;  
 $C_L$  = output load capacitance in pF;  
 $V_{CC}$  = supply voltage in V;  
 $C_{EXT}$  = timing capacitance in pF;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  sum of outputs.



$V_{CC} = 5.0$  V;  $T_{amb} = 25$  °C.

- (1)  $R_{EXT} = 100$  k $\Omega$   
(2)  $R_{EXT} = 50$  k $\Omega$   
(3)  $R_{EXT} = 10$  k $\Omega$   
(4)  $R_{EXT} = 2$  k $\Omega$

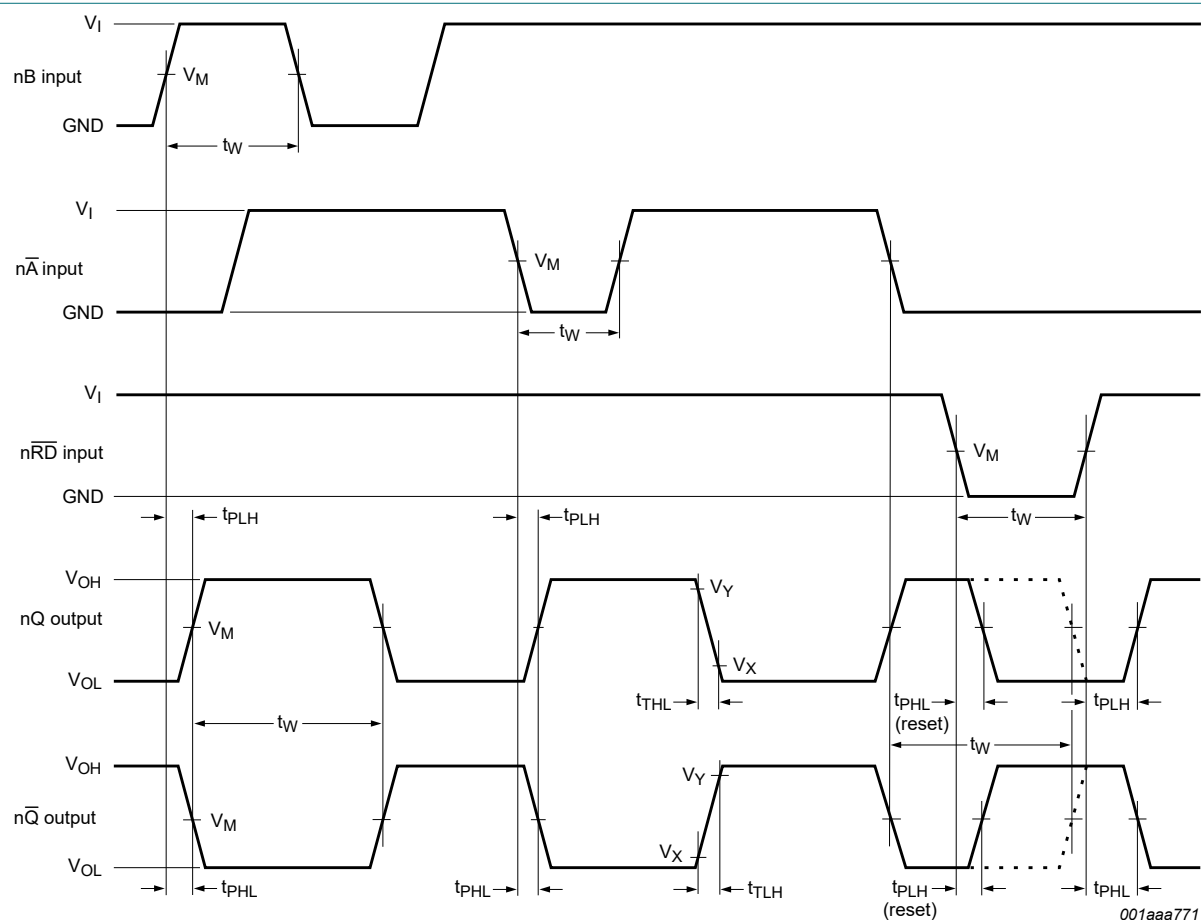
**Fig. 7.** Typical output pulse width as a function of the external capacitor value



$C_{EXT} = 10$  nF;  $R_{EXT} = 10$  k $\Omega$  to 100 k $\Omega$ .  
 $T_{amb} = 25$  °C.

**Fig. 8.** 74HC123 typical 'K' factor as function of  $V_{CC}$

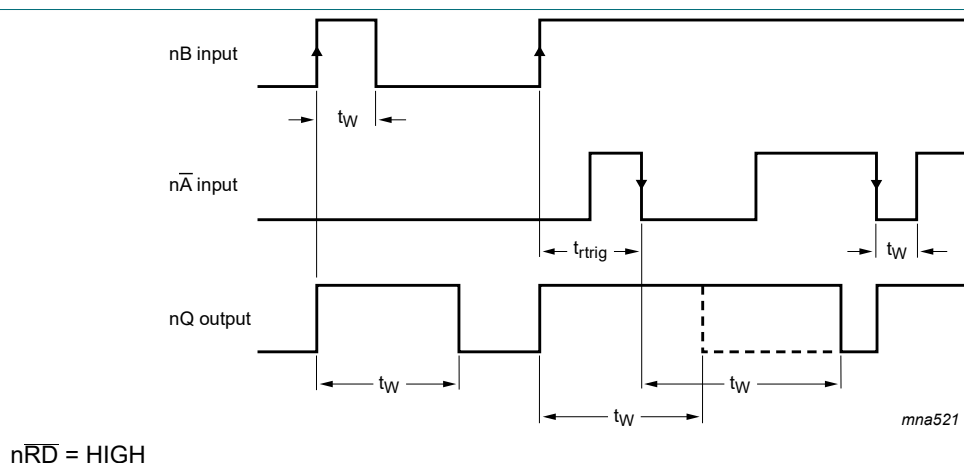
### 10.1. Waveforms and test circuit



Measurement points are given in [Table 8](#).

$V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig. 9. Propagation delays from inputs ( $n\bar{A}$ ,  $nB$ ,  $n\bar{RD}$ ) to outputs ( $nQ$ ,  $n\bar{Q}$ ) and output transition times**



**Fig. 10. Output pulse control using retrigger pulse**

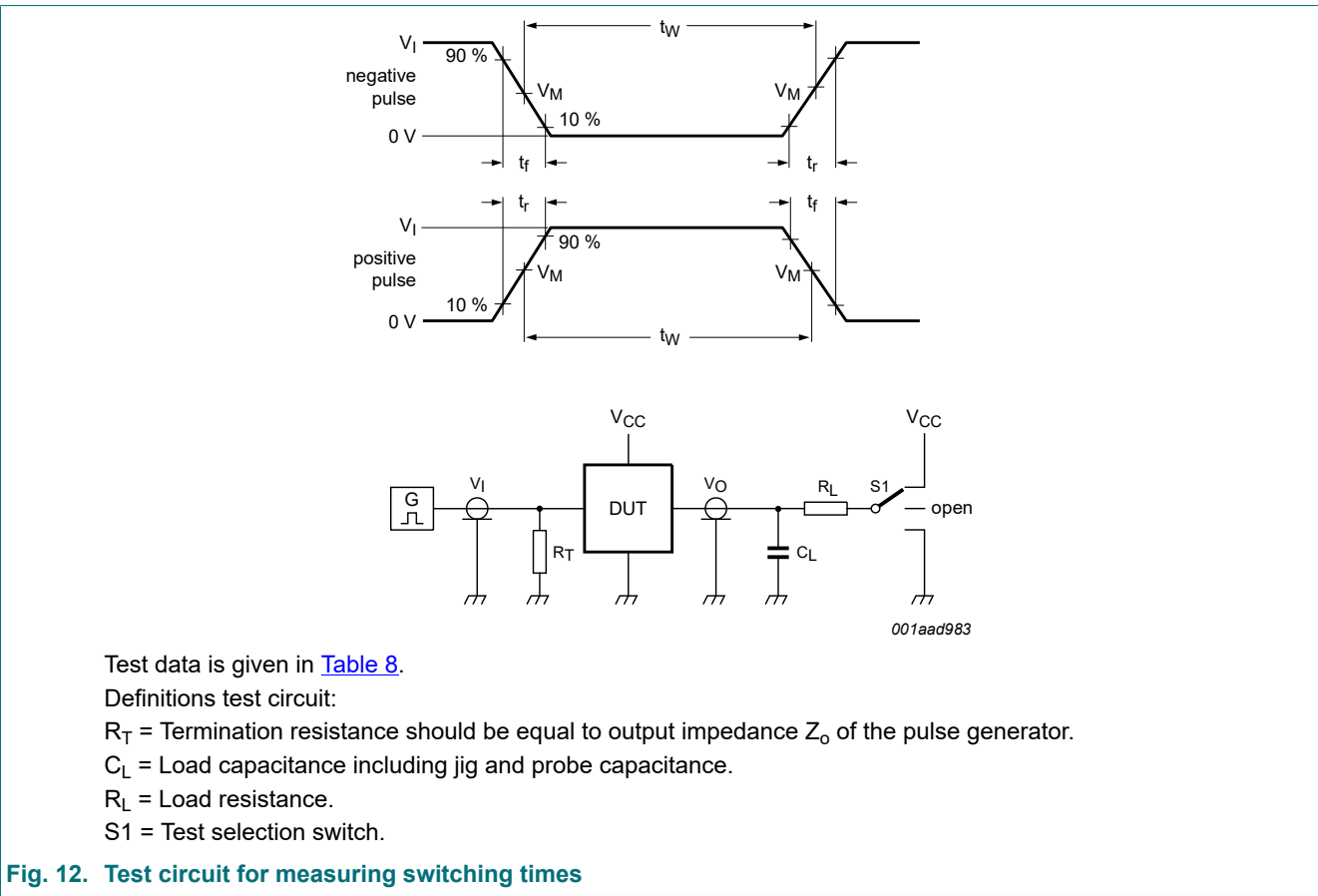
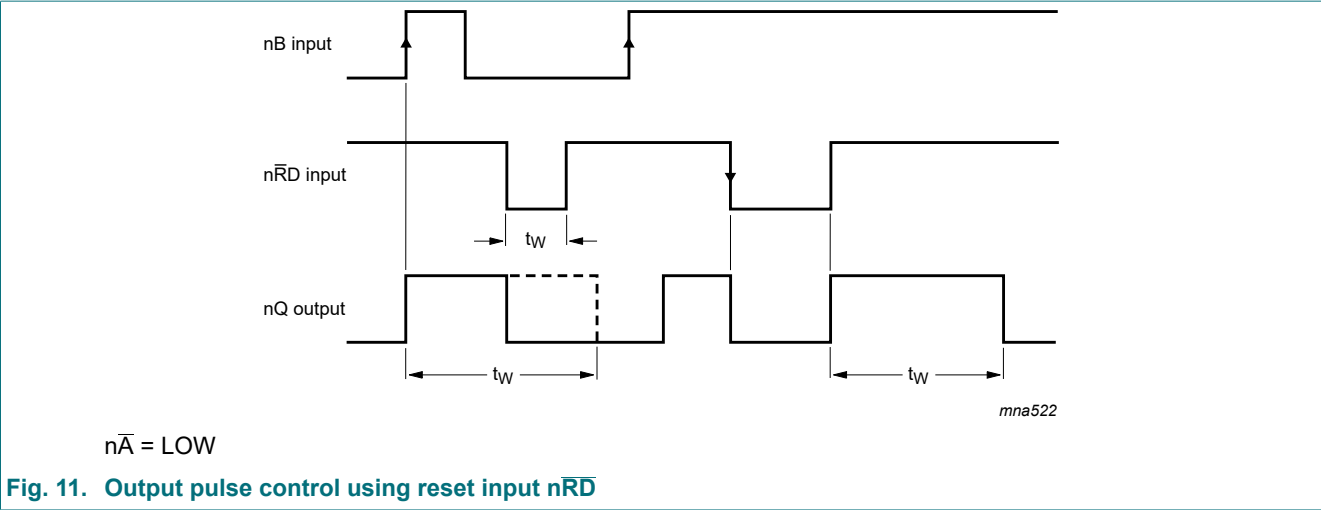


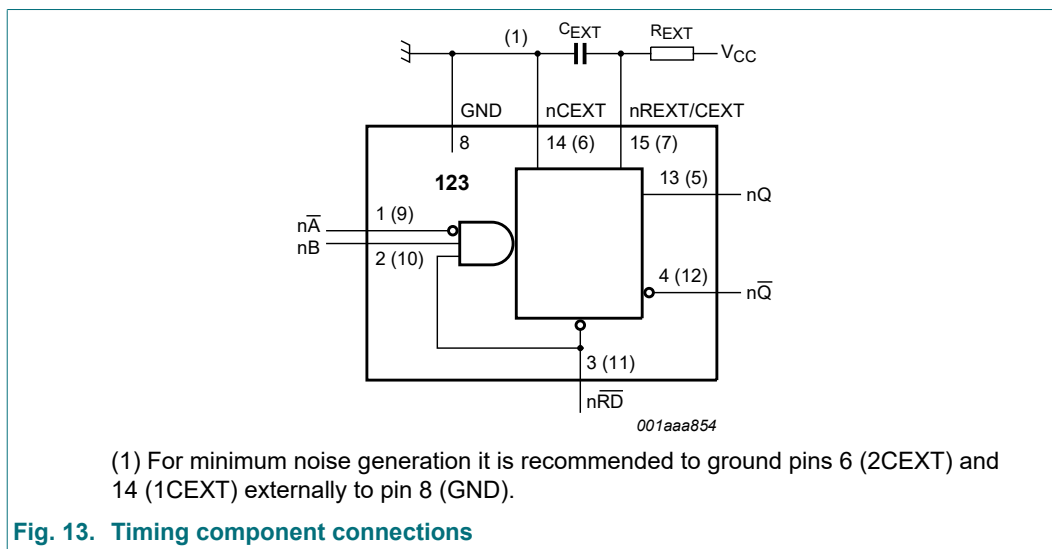
Table 8. Test data

Type	Input		Load		S1 position
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$
74HC123	$V_{CC}$	6 ns	15 pF, 50 pF	1 k $\Omega$	open
74HCT123	3 V	6 ns	15 pF, 50 pF	1 k $\Omega$	open

## 11. Application information

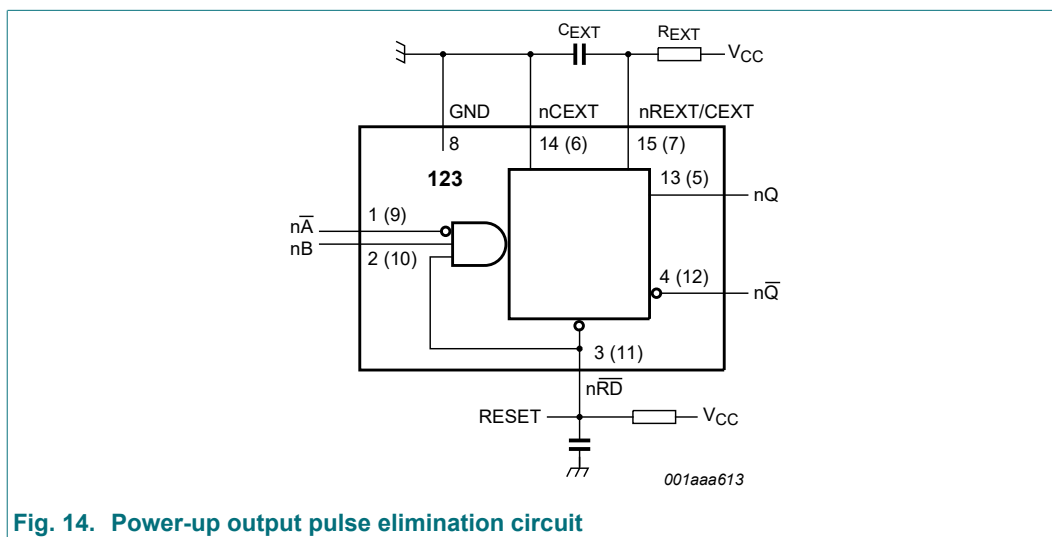
### 11.1. Timing component connections

The basic output pulse width is essentially determined by the values of the external timing components  $R_{EXT}$  and  $C_{EXT}$ .



### 11.2. Power-up considerations

When the monostable 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 circuit shown in [Fig. 14](#).



### 11.3. Power-down considerations

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, use a damping diode ( $D_{EXT}$ ) preferably a germanium or Schottky type diode able to withstand large current surges and connect as shown in [Fig. 15](#).

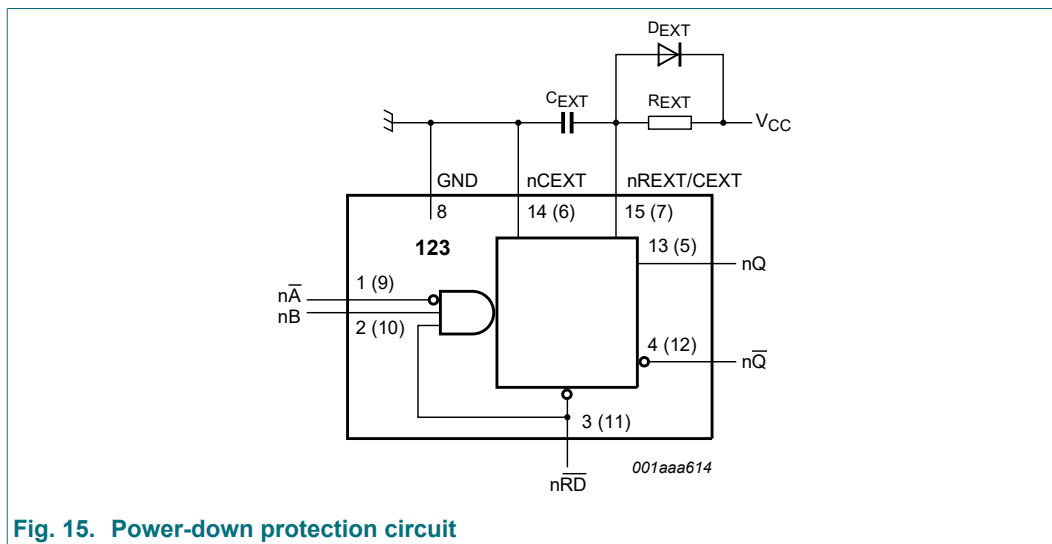


Fig. 15. Power-down protection circuit

12. Package outline

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

SOT109-1

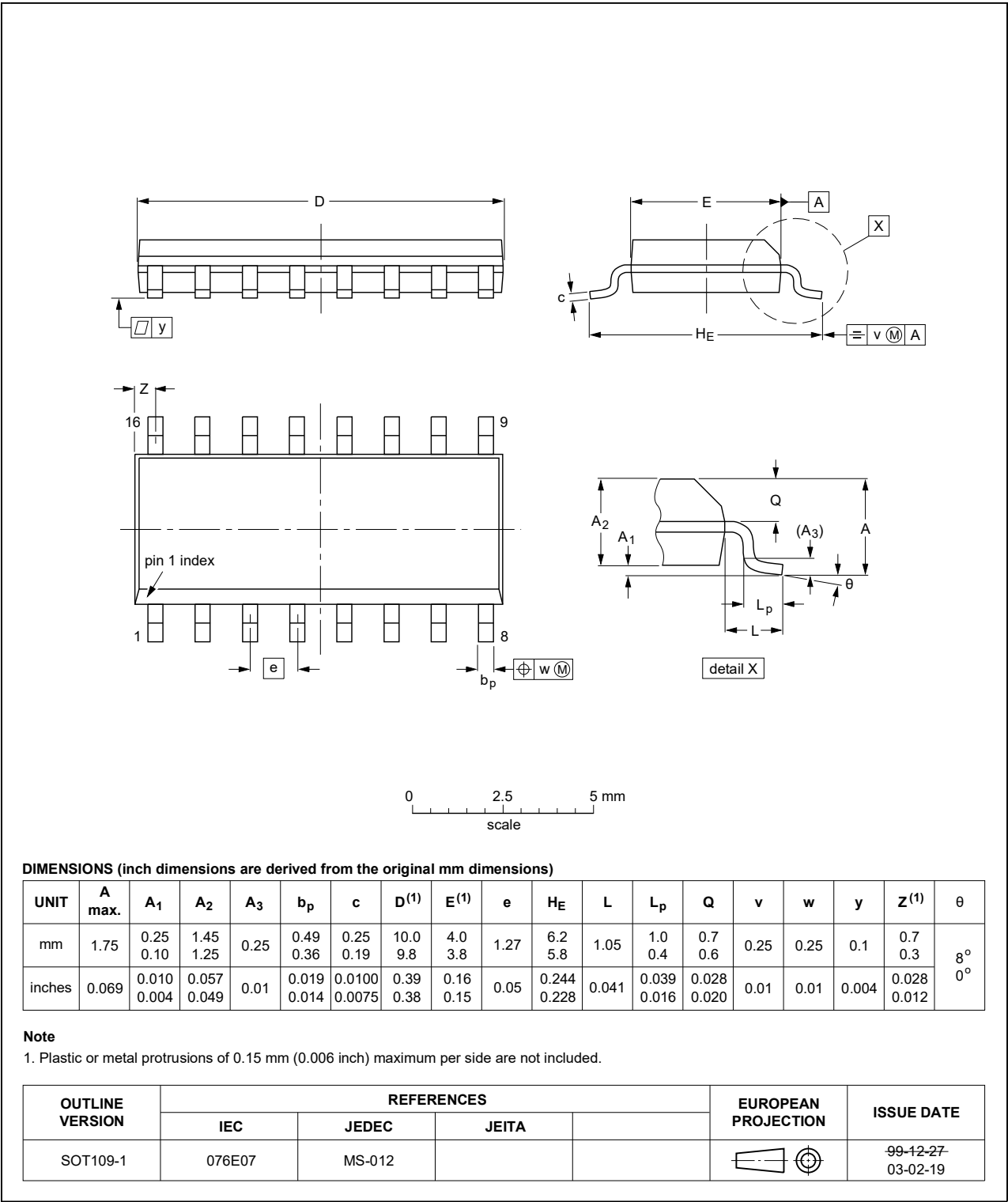


Fig. 16. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

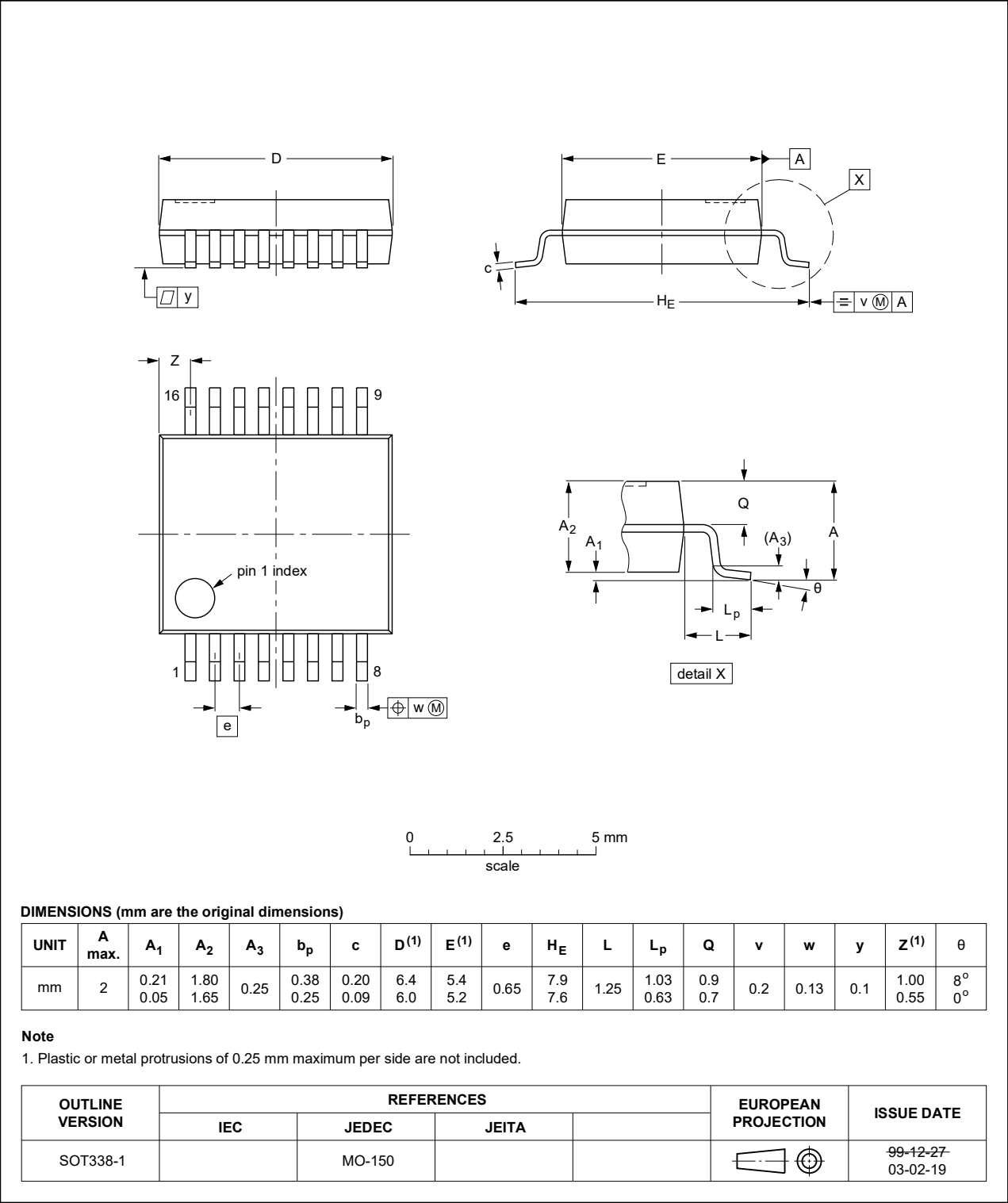


Fig. 17. Package outline SOT338-1 (SSOP16)



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

SOT403-1

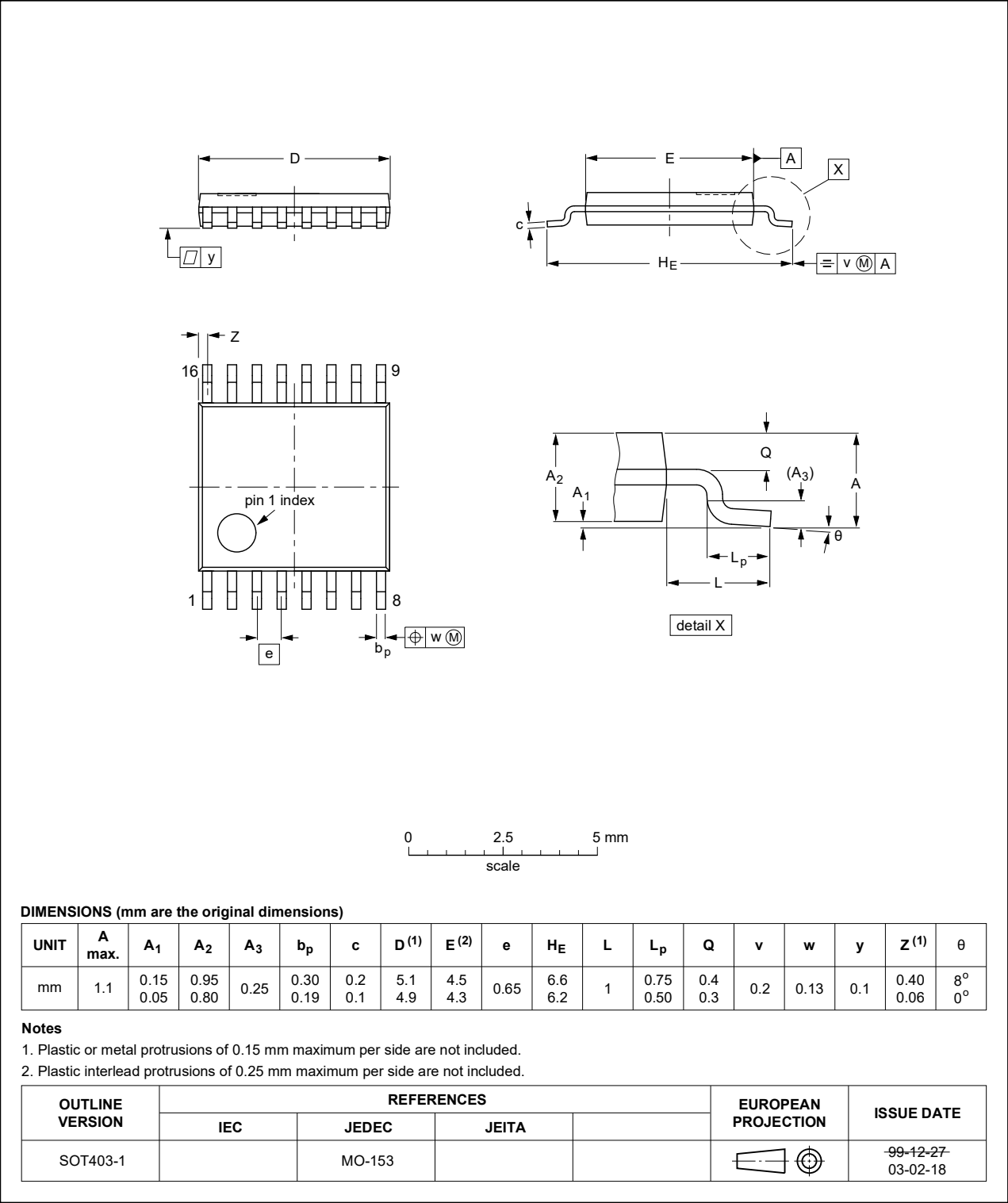


Fig. 18. Package outline SOT403-1 (TSSOP16)

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

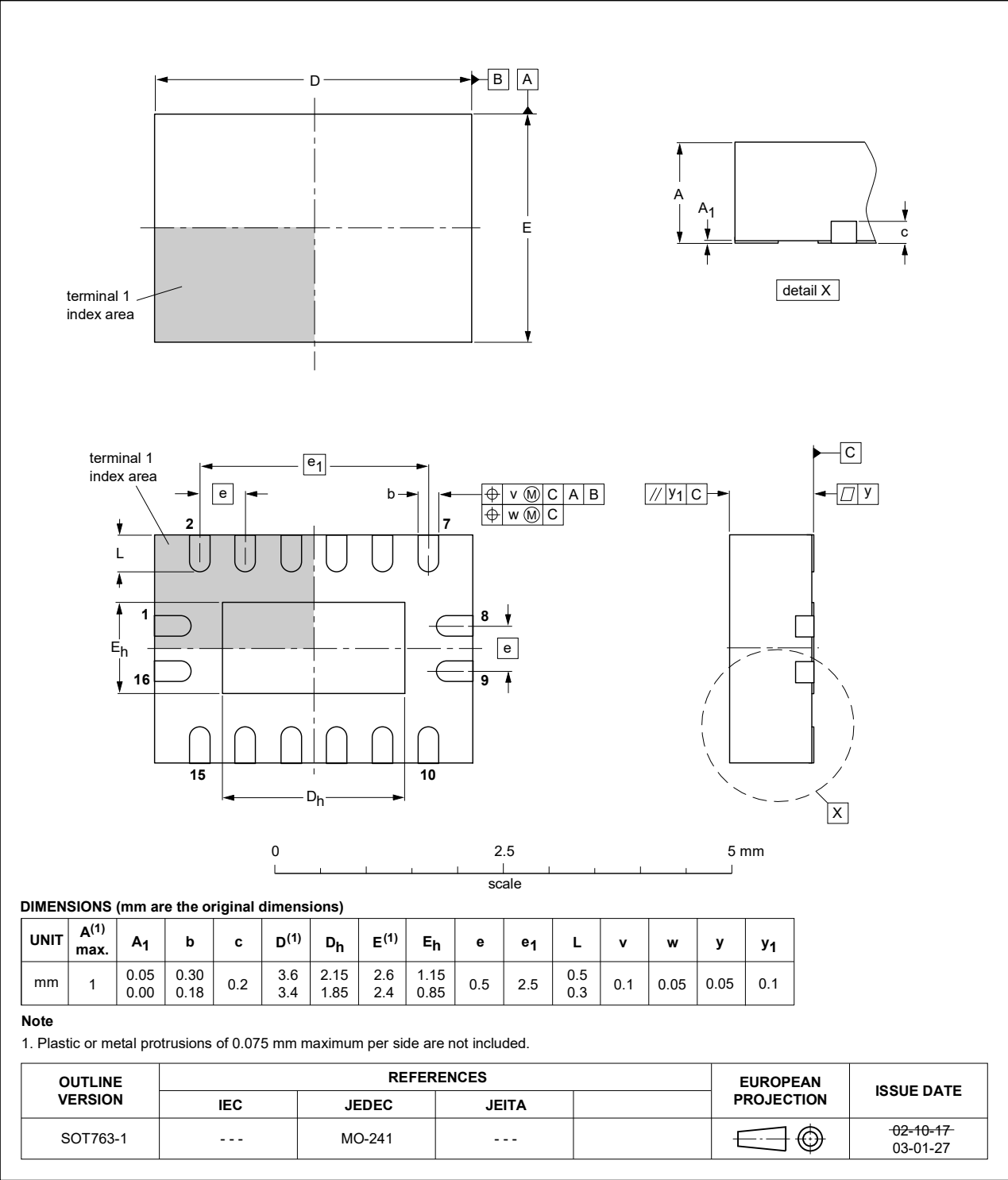


Fig. 19. Package outline SOT763-1 (DHVQFN16)

## 13. Abbreviations

Table 9. Abbreviations

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

## 14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT123 v.11	20200903	Product data sheet	-	74HC_HCT123 v.10
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><a href="#">Section 1</a> and <a href="#">Section 2</a> updated.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation have been updated.</li> </ul>			
74HC_HCT123 v.10	20151203	Product data sheet	-	74HC_HCT123 v.9
Modifications:	<ul style="list-style-type: none"> <li>Type numbers 74HC123N and 74HCT123N (SOT38-4) removed.</li> </ul>			
74HC_HCT123 v.9	20150119	Product data sheet	-	74HC_HCT123 v.8
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 7</a>: Power dissipation capacitance condition for 74HCT123 is corrected.</li> </ul>			
74HC_HCT123 v.8	20111216	Product data sheet	-	74HC_HCT123 v.7
Modifications:	<ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>			
74HC_HCT123 v.7	20110825	Product data sheet	-	74HC_HCT123 v.6
74HC_HCT123 v.6	20110314	Product data sheet	-	74HC_HCT123 v.5
74HC_HCT123 v.5	20090713	Product data sheet	-	74HC_HCT123 v.4
74HC_HCT123 v.4	20060616	Product data sheet	-	74HC_HCT123 v.3
74HC_HCT123 v.3	20040511	Product specification	-	74HC_HCT123_CNV v.2
74HC_HCT123_CNV v.2	19980708	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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