

# 74AHC123A; 74AHCT123A

Dual retriggerable monostable multivibrator with reset

Rev. 02 — 18 January 2008

Product data sheet

## 1. General description

The 74AHC123A; 74AHCT123A are high-speed Si-gate CMOS devices and are pin compatible with Low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74AHC123A; 74AHCT123A are dual retriggerable monostable multivibrators with output pulse width control by three methods. The basic pulse time is programmed by selection of an external resistor ( $R_{EXT}$ ) and capacitor ( $C_{EXT}$ ). The external resistor and capacitor are normally connected as shown in [Figure 11](#).

Once triggered, the basic output pulse width may be extended by retriggering the gated active LOW-going edge input ( $n\bar{A}$ ) or the active HIGH-going edge input ( $nB$ ). By repeating this process, the output pulse period ( $nQ = \text{HIGH}$ ,  $n\bar{Q} = \text{LOW}$ ) can be made as long as desired. Alternatively an output delay can be terminated at any time by a LOW-going edge on input  $n\bar{RD}$ , which also inhibits the triggering.

An internal connection from  $n\bar{RD}$  to the input gate makes it possible to trigger the circuit by a positive-going signal at input  $n\bar{RD}$  as shown in [Table 3](#), [Figure 8](#) and [Figure 9](#) illustrate pulse control by retriggering and early reset. The basic output pulse width is essentially determined by the value of the external timing components  $R_{EXT}$  and  $C_{EXT}$ . When  $C_{EXT} \geq 10 \text{ nF}$ , the typical output pulse width is defined as:  $t_W = R_{EXT} \times C_{EXT}$  where  $t_W = \text{pulse width in ns}$ ;  $R_{EXT} = \text{external resistor in k}\Omega$ ;  $C_{EXT} = \text{external capacitor in pF}$ . Schmitt-trigger action at all inputs makes the circuit highly tolerant to slower input rise and fall times. The 74AHC123A; 74AHCT123A is identical to the 74AHC423; 74AHCT423 but can be triggered via the reset input.

## 2. Features

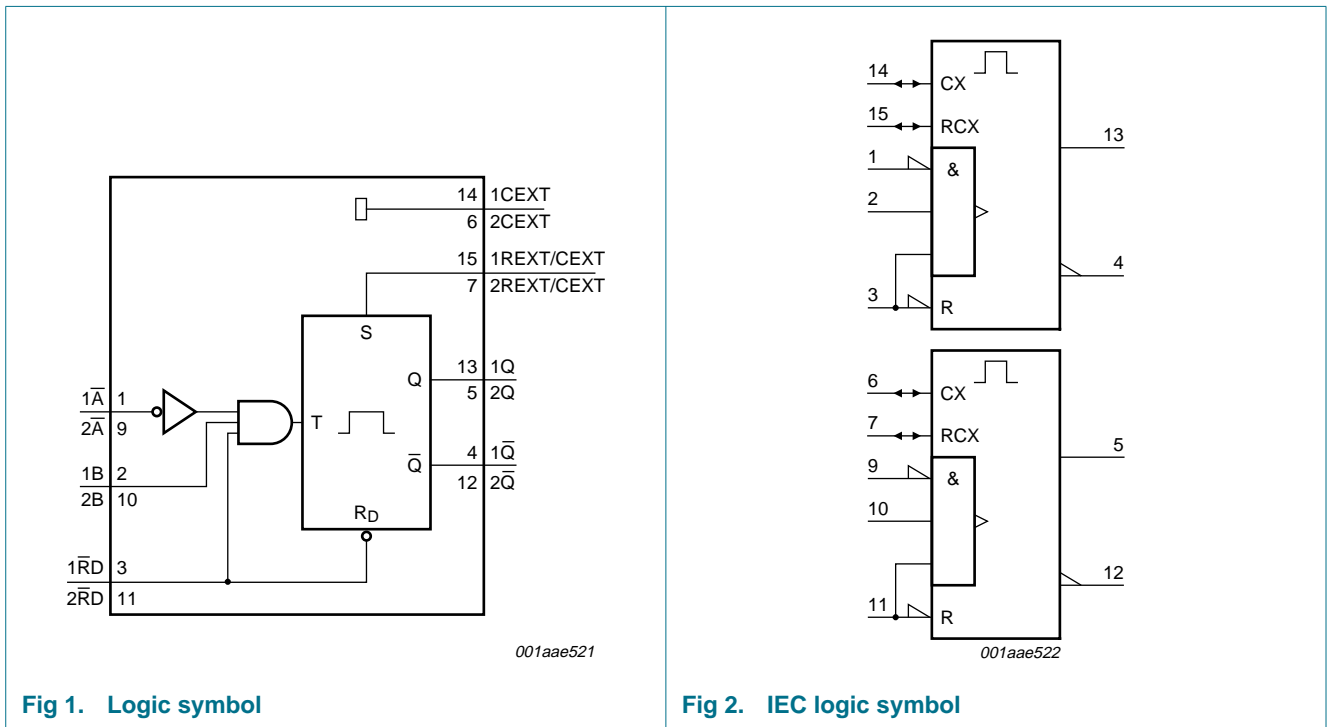
- All inputs have a Schmitt-trigger action
- Inputs accept voltages higher than  $V_{CC}$
- DC triggered from active HIGH or active LOW inputs
- Retriggerable for very long pulses up to 100 % duty factor
- Direct reset terminates output pulse
- For 74AHC123A only: operates with CMOS input levels
- For 74AHCT123A only: operates with TTL input levels
- ESD protection:
  - ◆ HBM JESD22-A114E exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from  $-40 \text{ }^\circ\text{C}$  to  $+85 \text{ }^\circ\text{C}$  and from  $-40 \text{ }^\circ\text{C}$  to  $+125 \text{ }^\circ\text{C}$

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AHC123AD 74AHCT123AD	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHC123APW 74AHCT123APW	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74AHC123ABQ 74AHCT123ABQ	-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



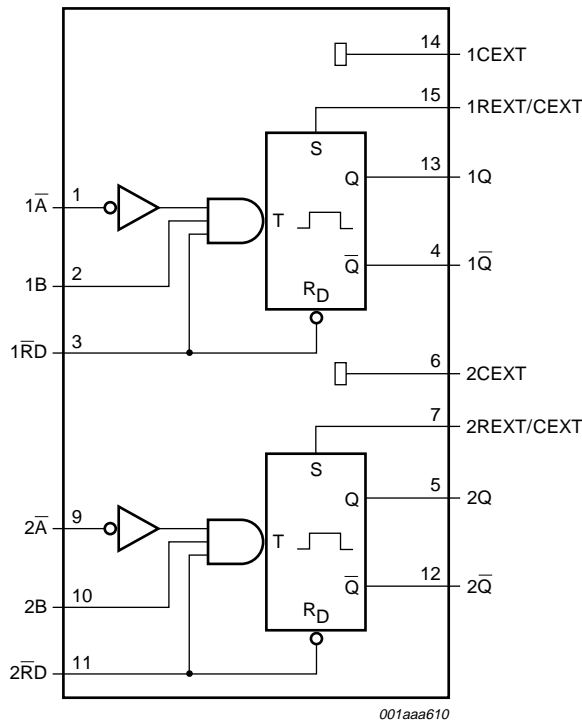
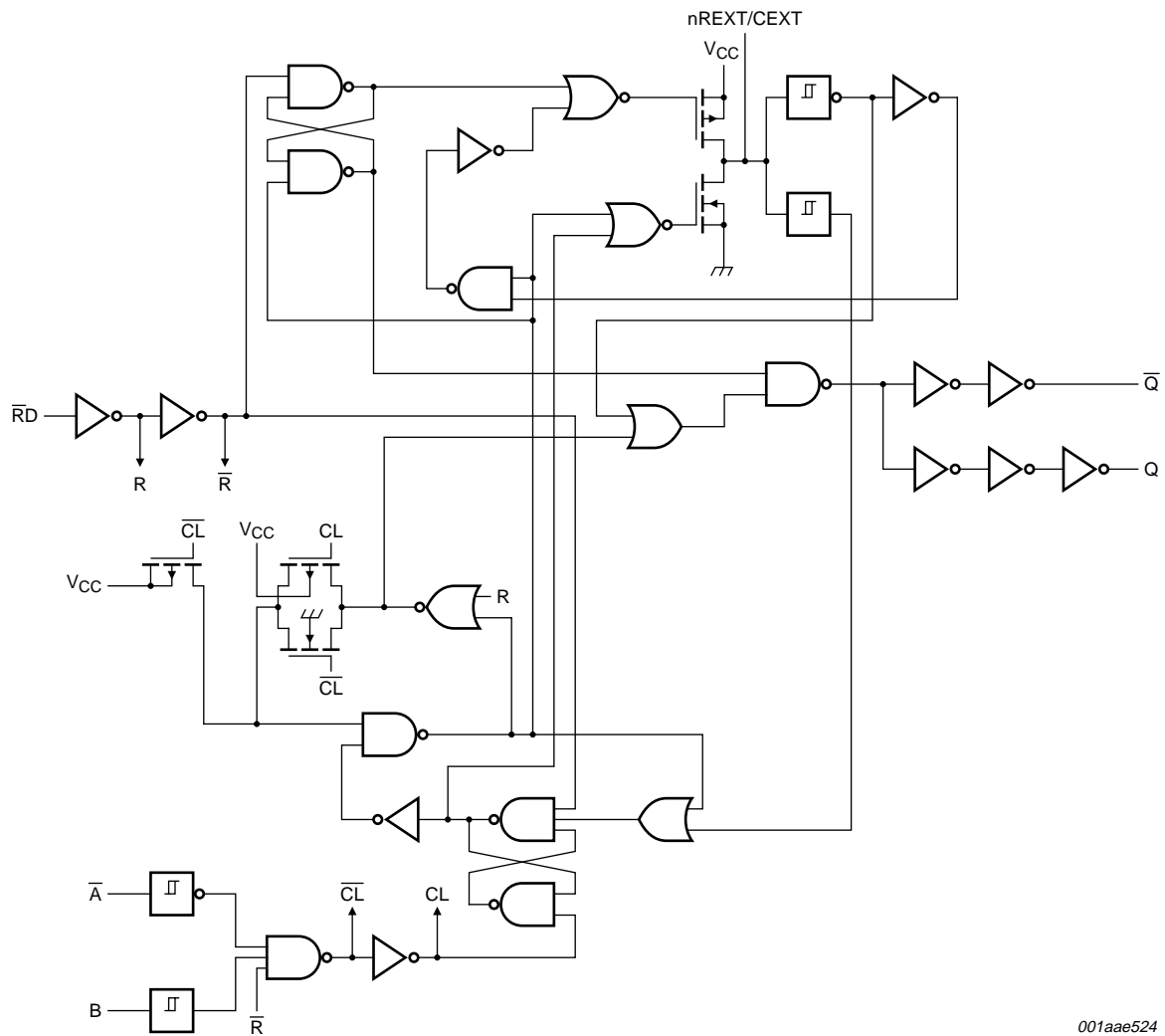


Fig 3. Functional diagram



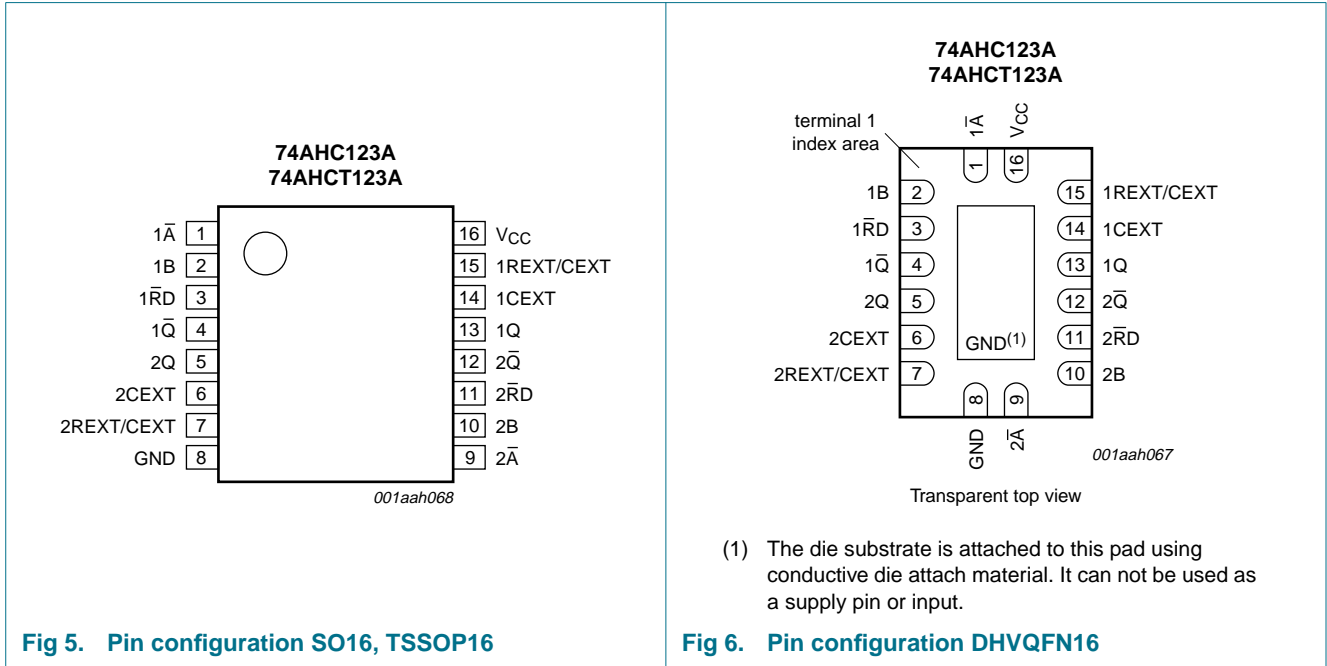
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For minimum noise generation it is recommended to ground pins 6 (2CEXT) and 14 (1CEXT) externally to pin 8 (GND).

**Fig 4. Functional diagram**

## 5. Pinning information

### 5.1 Pinning









### 5.2 Pin description

**Table 2. Pin description**


Symbol	Pin	Description
1 $\bar{A}$	1	negative-edge triggered input 1
1B	2	positive-edge triggered input 1
1 $\bar{R}D$	3	direct reset LOW and positive-edge triggered input 1
1 $\bar{Q}$	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)
2 $\bar{A}$	9	negative-edge triggered input 2
2B	10	positive-edge triggered input 2
2 $\bar{R}D$	11	direct reset LOW and positive-edge triggered input 2
2 $\bar{Q}$	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<sup>[1]</sup>**

Input			Output	
nRD	nA	nB	nQ	nQ
L	X	X	L	H
X	H	X	L <sup>[2]</sup>	H <sup>[2]</sup>
X	X	L	L <sup>[2]</sup>	H <sup>[2]</sup>
H	L	↑		
H	↓	H		
↑	L	H		

- [1] H = HIGH voltage level;
- L = LOW voltage level;
- X = don't care;
- ↑ = LOW-to-HIGH transition;
- ↓ = HIGH-to-LOW transition;

 = one HIGH level output pulse;

 = one LOW level output pulse.

- [2] If the monostable 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	+7.0	V
V <sub>I</sub>	input voltage		-0.5	+7.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V	<sup>[1]</sup> -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	<sup>[1]</sup> -	±20	mA
I <sub>O</sub>	output current	V <sub>O</sub> = -0.5 V to (V <sub>CC</sub> + 0.5 V)	-	±25	mA
I <sub>CC</sub>	supply current		-	75	mA
I <sub>GND</sub>	ground current		-75	-	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			
	SO16 package		<sup>[2]</sup> -	500	mW
	TSSOP16 package		<sup>[3]</sup> -	500	mW
	DHVQFN16 package		<sup>[4]</sup> -	500	mW

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
- [2] P<sub>tot</sub> derates linearly with 8 mW/K above 70 °C.
- [3] P<sub>tot</sub> derates linearly with 5.5 mW/K above 60 °C.
- [4] P<sub>tot</sub> derates linearly with 4.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74AHC123A			74AHCT123A			Unit
			Min	Typ	Max	Min	Typ	Max	
$V_{CC}$	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
$V_I$	input voltage		0	-	5.5	0	-	5.5	V
$V_O$	output voltage		0	-	$V_{CC}$	0	-	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	-	-	100	-	-	-	ns/V
		$V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	-	-	20	-	-	20	ns/V

## 9. Static characteristics

**Table 6. Static characteristics**

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		
<b>74AHC123A</b>											
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	-	-	1.5	-	1.5	-	V	
		$V_{CC} = 3.0\text{ V}$	2.1	-	-	2.1	-	2.1	-	V	
		$V_{CC} = 5.5\text{ V}$	3.85	-	-	3.85	-	3.85	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	-	0.5	-	0.5	-	0.5	V	
		$V_{CC} = 3.0\text{ V}$	-	-	0.9	-	0.9	-	0.9	V	
		$V_{CC} = 5.5\text{ V}$	-	-	1.65	-	1.65	-	1.65	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$									
		$I_O = -50\ \mu\text{A}$ ; $V_{CC} = 2.0\text{ V}$	1.9	2.0	-	1.9	-	1.9	-	V	
		$I_O = -50\ \mu\text{A}$ ; $V_{CC} = 3.0\text{ V}$	2.9	3.0	-	2.9	-	2.9	-	V	
		$I_O = -50\ \mu\text{A}$ ; $V_{CC} = 4.5\text{ V}$	4.4	4.5	-	4.4	-	4.4	-	V	
		$I_O = -4.0\text{ mA}$ ; $V_{CC} = 3.0\text{ V}$	2.58	-	-	2.48	-	2.40	-	V	
		$I_O = -8.0\text{ mA}$ ; $V_{CC} = 4.5\text{ V}$	3.94	-	-	3.8	-	3.70	-	V	
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$									
		$I_O = 50\ \mu\text{A}$ ; $V_{CC} = 2.0\text{ V}$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 50\ \mu\text{A}$ ; $V_{CC} = 3.0\text{ V}$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 50\ \mu\text{A}$ ; $V_{CC} = 4.5\text{ V}$	-	0	0.1	-	0.1	-	0.1	V	
		$I_O = 4.0\text{ mA}$ ; $V_{CC} = 3.0\text{ V}$	-	-	0.36	-	0.44	-	0.55	V	
		$I_O = 8.0\text{ mA}$ ; $V_{CC} = 4.5\text{ V}$	-	-	0.36	-	0.44	-	0.55	V	
$I_I$	input leakage current	$V_I = 5.5\text{ V}$ or GND; $V_{CC} = 0\text{ V}$ to $5.5\text{ V}$									
		nREXT/CEXT	<a href="#">[1]</a>	-	-	$\pm 0.25$	-	$\pm 2.5$	-	$\pm 10.0$	$\mu\text{A}$
		pin n $\bar{A}$ , nB, n $\bar{RD}$	-	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 2.0$	$\mu\text{A}$	

**Table 6. Static characteristics ...continued**  
 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		
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	-	-	4.0	-	40	-	80	μA	
		active state (per circuit); V <sub>I</sub> = V <sub>CC</sub> or GND	[1]								
		V <sub>CC</sub> = 3.0 V	-	160	250	-	280	-	280	μA	
		V <sub>CC</sub> = 4.5 V	-	380	500	-	650	-	650	μA	
		V <sub>CC</sub> = 5.5 V	-	560	750	-	975	-	975	μA	
C <sub>I</sub>	input capacitance		-	5.0	10	-	10	-	10	pF	
C <sub>O</sub>	output capacitance		-	4.0	-	-	-	-	-	pF	
<b>74AHCT123A</b>											
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V	
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	-	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> = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V	
		I <sub>O</sub> = -8.0 mA	3.94	-	-	3.8	-	3.70	-	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> = 50 μA	-	0	0.1	-	0.1	-	0.1	V	
		I <sub>O</sub> = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V	
I <sub>I</sub>	input leakage current	nREXT/CEXT; V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V	[1]								
		pin n $\bar{A}$ , nB, n $\bar{R}$ D; V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±0.1	-	±1.0	-	±2.0	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	-	-	4.0	-	40	-	80	μA	
		active state (per circuit); V <sub>I</sub> = V <sub>CC</sub> or GND	[1]								
		V <sub>CC</sub> = 4.5 V	-	380	500	-	650	-	650	μA	
		V <sub>CC</sub> = 5.5 V	-	560	750	-	975	-	975	μA	
C <sub>I</sub>	input capacitance		-	3	10	-	10	-	10	pF	
C <sub>O</sub>	output capacitance		-	4.0	-	-	-	-	-	pF	

[1] Voltage on nREXT/CEXT = 0.5 × V<sub>CC</sub> and pin REXT/CEXT in OFF-state during test.



## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
*GND = 0 V; For test circuit see Figure 12.*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max		
<b>74AHC123A</b>											
$t_{pd}$	propagation delay	$n\bar{A}$ and $nB$ to $nQ$ and $n\bar{Q}$ ; see Figure 7 <sup>[2]</sup>	$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
			$C_L = 15\text{ pF}$	-	7.4	20.6	1.0	24.0	1.0	26.0	ns
			$C_L = 50\text{ pF}$	-	10.5	24.1	1.0	27.5	1.0	30.0	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
			$C_L = 15\text{ pF}$	-	5.1	12.0	1.0	14.0	1.0	15.5	ns
			$C_L = 50\text{ pF}$	-	7.3	14.0	1.0	16.0	1.0	17.5	ns
		$n\bar{RD}$ to $nQ$ and $n\bar{Q}$ ; see Figure 7 <sup>[2]</sup>	$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
			$C_L = 15\text{ pF}$	-	8.2	22.4	1.0	26.0	1.0	28.0	ns
			$C_L = 50\text{ pF}$	-	11.7	25.9	1.0	29.5	1.0	32.0	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
			$C_L = 15\text{ pF}$	-	5.6	12.9	1.0	15.0	1.0	16.5	ns
			$C_L = 50\text{ pF}$	-	8.1	14.9	1.0	17.0	1.0	19.0	ns
		$n\bar{RD}$ to $nQ$ and $n\bar{Q}$ (reset); see Figure 7 <sup>[2]</sup>	$V_{CC} = 3.0\text{ V to }3.6\text{ V}$								
			$C_L = 15\text{ pF}$	-	6.4	15.8	1.0	18.5	1.0	20.0	ns
			$C_L = 50\text{ pF}$	-	9.2	19.3	1.0	22.0	1.0	24.5	ns
			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
			$C_L = 15\text{ pF}$	-	4.4	9.4	1.0	11.0	1.0	12.0	ns
			$C_L = 50\text{ pF}$	-	6.3	11.4	1.0	13.0	1.0	14.5	ns

**Table 7. Dynamic characteristics ...continued**  
*GND = 0 V; For test circuit see [Figure 12](#).*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
$t_W$	pulse width	inputs; $n\bar{A}$ = LOW; see <a href="#">Figure 7</a>								
		$V_{CC}$ = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC}$ = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $nB$ = HIGH; see <a href="#">Figure 7</a>								
		$V_{CC}$ = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC}$ = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $n\bar{RD}$ = LOW; see <a href="#">Figure 7</a>								
		$V_{CC}$ = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		$V_{CC}$ = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		outputs; $n\bar{Q}$ = LOW and $nQ$ = HIGH; $C_L$ = 50 pF; see <a href="#">Figure 7</a> , <a href="#">Figure 8</a> , <a href="#">Figure 9</a> and <a href="#">Figure 10</a>		<sup>[3]</sup>						
		$C_{EXT}$ = 28 pF; $R_{EXT}$ = 2 k $\Omega$								
		$V_{CC}$ = 3.0 V to 3.6 V	-	115	240	-	300	-	300	ns
		$V_{CC}$ = 4.5 V to 5.5 V	-	100	200	-	240	-	240	ns
		$C_{EXT}$ = 0.01 $\mu$ F; $R_{EXT}$ = 10 k $\Omega$								
$V_{CC}$ = 3.0 V to 3.6 V	90	100	110	90	110	85	115	$\mu$ s		
$V_{CC}$ = 4.5 V to 5.5 V	90	100	110	90	110	85	115	$\mu$ s		
$C_{EXT}$ = 0.1 $\mu$ F; $R_{EXT}$ = 10 k $\Omega$ ;										
$V_{CC}$ = 3.0 V to 3.6 V	0.9	1	1.1	0.9	1.1	0.85	1.15	ms		
$V_{CC}$ = 4.5 V to 5.5 V	0.9	1	1.1	0.9	1.1	0.85	1.15	ms		
$t_{trig}$	retrigger time	$n\bar{A}$ to $nB$ ; $C_{EXT}$ = 100 pF; $R_{EXT}$ = 1 k $\Omega$ ; $C_L$ = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
		$V_{CC}$ = 3.0 V to 3.6 V	-	60	-	-	-	-	-	ns
		$V_{CC}$ = 4.5 V to 5.5 V	-	39	-	-	-	-	-	ns
		$n\bar{A}$ to $nB$ ; $C_{EXT}$ = 0.01 $\mu$ F; $R_{EXT}$ = 1 k $\Omega$ ; $C_L$ = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
		$V_{CC}$ = 3.0 V to 3.6 V	-	1.5	-	-	-	-	-	$\mu$ s
$V_{CC}$ = 4.5 V to 5.5 V	-	1.2	-	-	-	-	-	$\mu$ s		
$C_{PD}$	power dissipation capacitance	$C_L$ = 50 pF; $f_i$ = 1 MHz; $V_i$ = GND to $V_{CC}$	<sup>[4]</sup>	-	57	-	-	-	-	pF

**Table 7. Dynamic characteristics ...continued**  
*GND = 0 V; For test circuit see [Figure 12](#).*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
<b>74AHCT123A</b>										
$t_{pd}$	propagation delay	$n\bar{A}$ and $nB$ to $nQ$ and $n\bar{Q}$ ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	5.0	12.0	1.0	14.0	1.0	15.5	ns
		$C_L = 50\text{ pF}$	-	7.1	14.0	1.0	16.0	1.0	17.5	ns
		$n\bar{RD}$ to $nQ$ and $n\bar{Q}$ ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	5.2	12.9	1.0	15.0	1.0	16.5	ns
		$C_L = 50\text{ pF}$	-	7.5	14.9	1.0	17.0	1.0	18.5	ns
		$n\bar{RD}$ to $nQ$ and $n\bar{Q}$ (reset); see <a href="#">Figure 7</a> <sup>[2]</sup>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$								
		$C_L = 15\text{ pF}$	-	4.7	9.4	1.0	11.0	1.0	12.0	ns
		$C_L = 50\text{ pF}$	-	6.7	11.4	1.0	13.0	1.0	14.5	ns
$t_w$	pulse width	inputs; $n\bar{A} = \text{LOW}$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 7</a>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $nB = \text{HIGH}$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 7</a>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $n\bar{RD} = \text{LOW}$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 7</a>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	5.0	-	-	5.0	-	5.0	-	ns
		outputs; $n\bar{Q} = \text{LOW}$ and $nQ = \text{HIGH}$ ; $C_L = 50\text{ pF}$ ; $C_{EXT} = 28\text{ pF}$ ; $R_{EXT} = 2\text{ k}\Omega$ ; see <a href="#">Figure 7</a> , <a href="#">Figure 8</a> , <a href="#">Figure 9</a> and <a href="#">Figure 10</a> <sup>[3]</sup>								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	100	200	-	240	-	240	ns
		$C_{EXT} = 0.01\text{ }\mu\text{F}$ ; $R_{EXT} = 10\text{ k}\Omega$								
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	90	100	110	90	110	85	115	$\mu\text{s}$
$C_{EXT} = 0.1\text{ }\mu\text{F}$ ; $R_{EXT} = 10\text{ k}\Omega$										
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	0.9	1	1.1	0.9	1.1	0.85	1.15	ms		

**Table 7. Dynamic characteristics ...continued**  
*GND = 0 V; For test circuit see [Figure 12](#).*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
t <sub>rtrig</sub>	retrigger time	n $\bar{A}$ to nB; C <sub>EXT</sub> = 100 pF; R <sub>EXT</sub> = 1 k $\Omega$ ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	60	-	-	-	-	-	ns
		n $\bar{A}$ to nB; C <sub>EXT</sub> = 0.01 $\mu$ F; R <sub>EXT</sub> = 1 k $\Omega$ ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.5	-	-	-	-	-	$\mu$ s
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>i</sub> = GND to V <sub>CC</sub>	<a href="#">[4]</a>	58	-	-	-	-	-	pF
<b>External components</b>										
R <sub>EXT</sub>	external resistance	V <sub>CC</sub> = 2.0 V	5	-	-	-	-	-	-	k $\Omega$
		V <sub>CC</sub> > 3.0 V	1	-	-	-	-	-	-	k $\Omega$
C <sub>EXT</sub>	external capacitance	V <sub>CC</sub> = 2.0 V	<a href="#">[5]</a>	-	-	-	-	-	-	pF
		V <sub>CC</sub> > 3.0 V	<a href="#">[5]</a>	-	-	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage (V<sub>CC</sub> = 3.3 V and V<sub>CC</sub> = 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 k $\Omega$ .

[3] For C<sub>EXT</sub>  $\geq$  10 nF the typical value of the pulse width t<sub>W</sub> ( $\mu$ s) = C<sub>EXT</sub> (nF)  $\times$  R<sub>EXT</sub> (k $\Omega$ ).

[4] C<sub>PD</sub> is used to determine the dynamic power dissipation P<sub>D</sub> ( $\mu$ W).

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

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

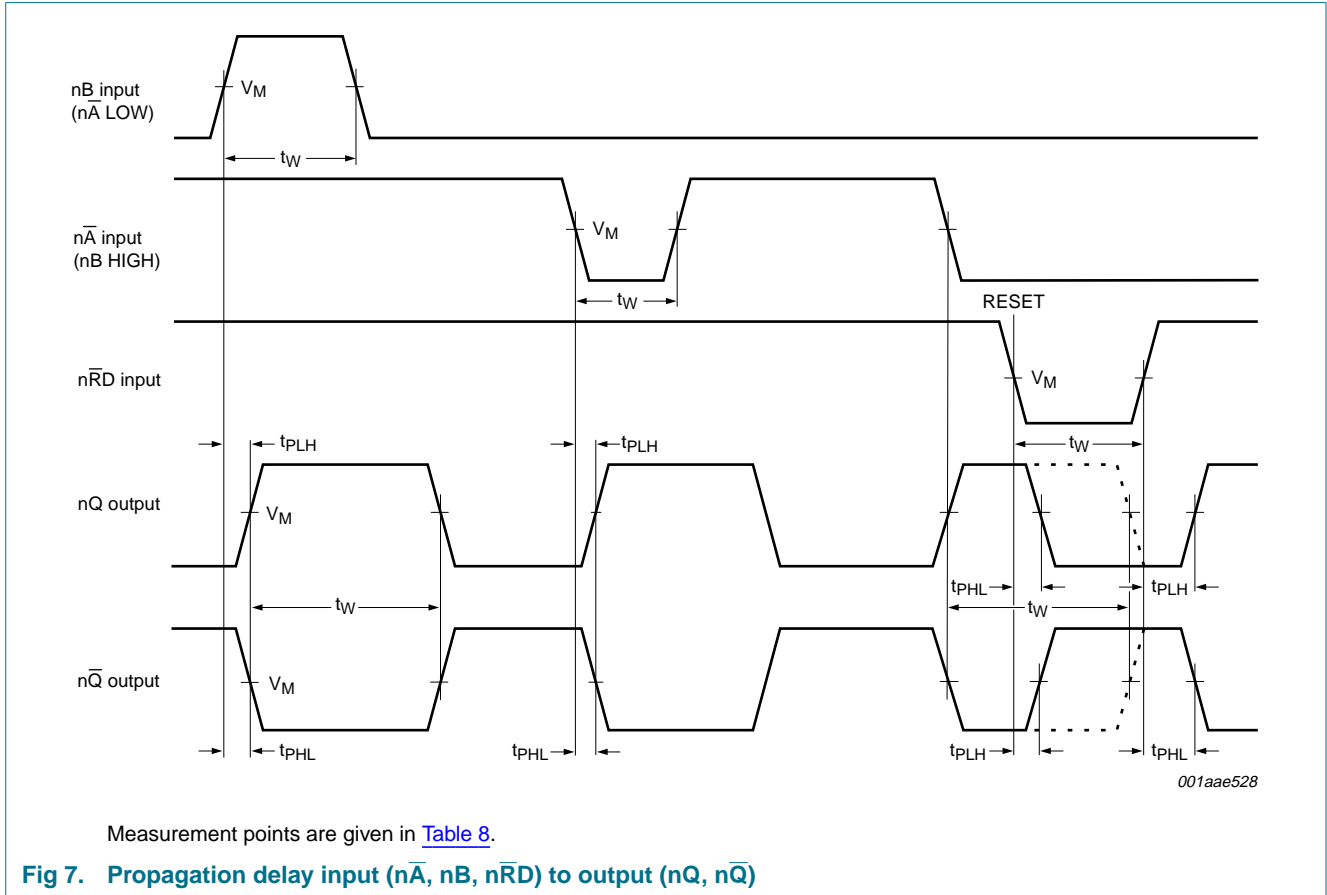
f<sub>o</sub> = output frequency in MHz;

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

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

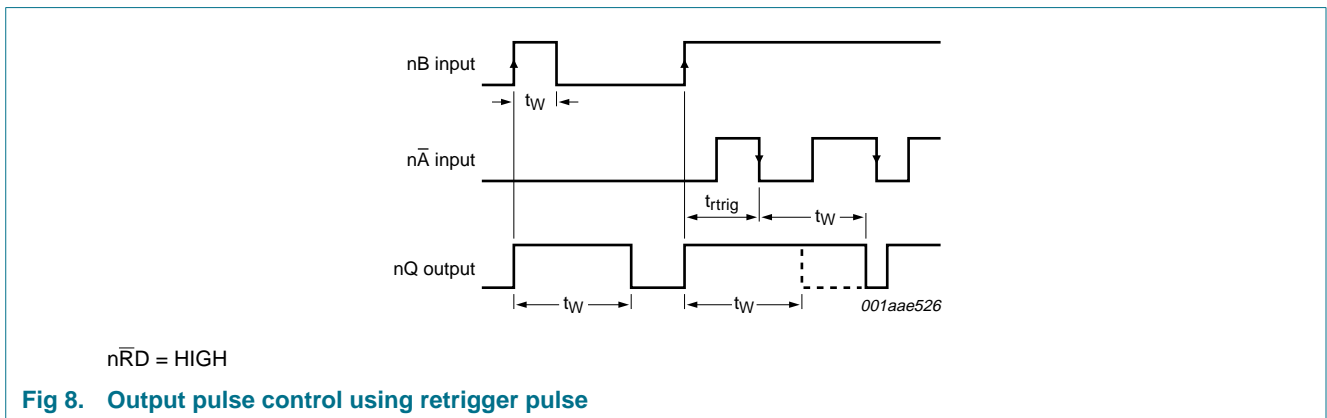
[5] C<sub>EXT</sub> has no limits.

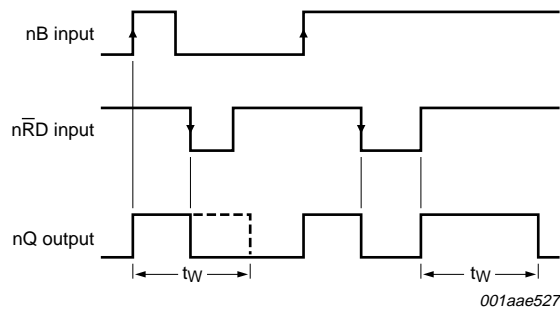
## 11. Waveforms



**Table 8. Measurement points**

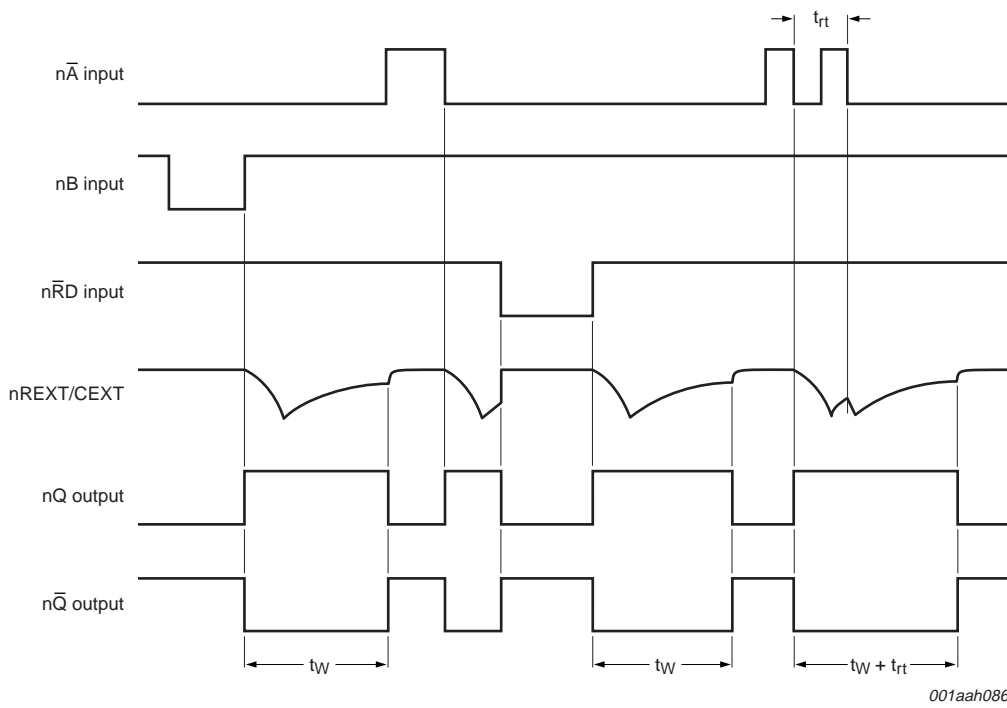
Type	Input	Output
	$V_M$	$V_M$
74AHC123A	$0.5V_{CC}$	$0.5V_{CC}$
74AHCT123A	1.5 V	$0.5V_{CC}$





$n\bar{A} = \text{LOW}$

**Fig 9. Output pulse control using reset input  $n\bar{RD}$**



**Fig 10. Input and output timing**

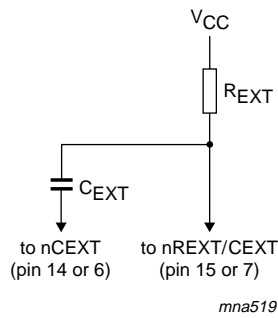
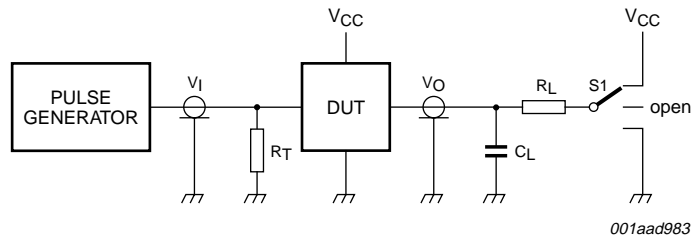
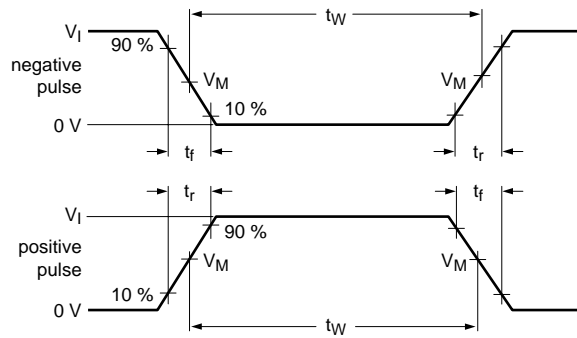


Fig 11. Timing component connections



Test data is given in [Table 9](#).

Definitions test circuit:

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator

$C_L$  = Load capacitance including jig and probe capacitance

$R_L$  = Load resistor

S1 = Test selection switch

Fig 12. Load circuitry for switching times

Table 9. Test data

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74AHC123A	$V_{CC}$	3.0 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT123A	3.0 V	3.0 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 12. Package outline

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

SOT109-1

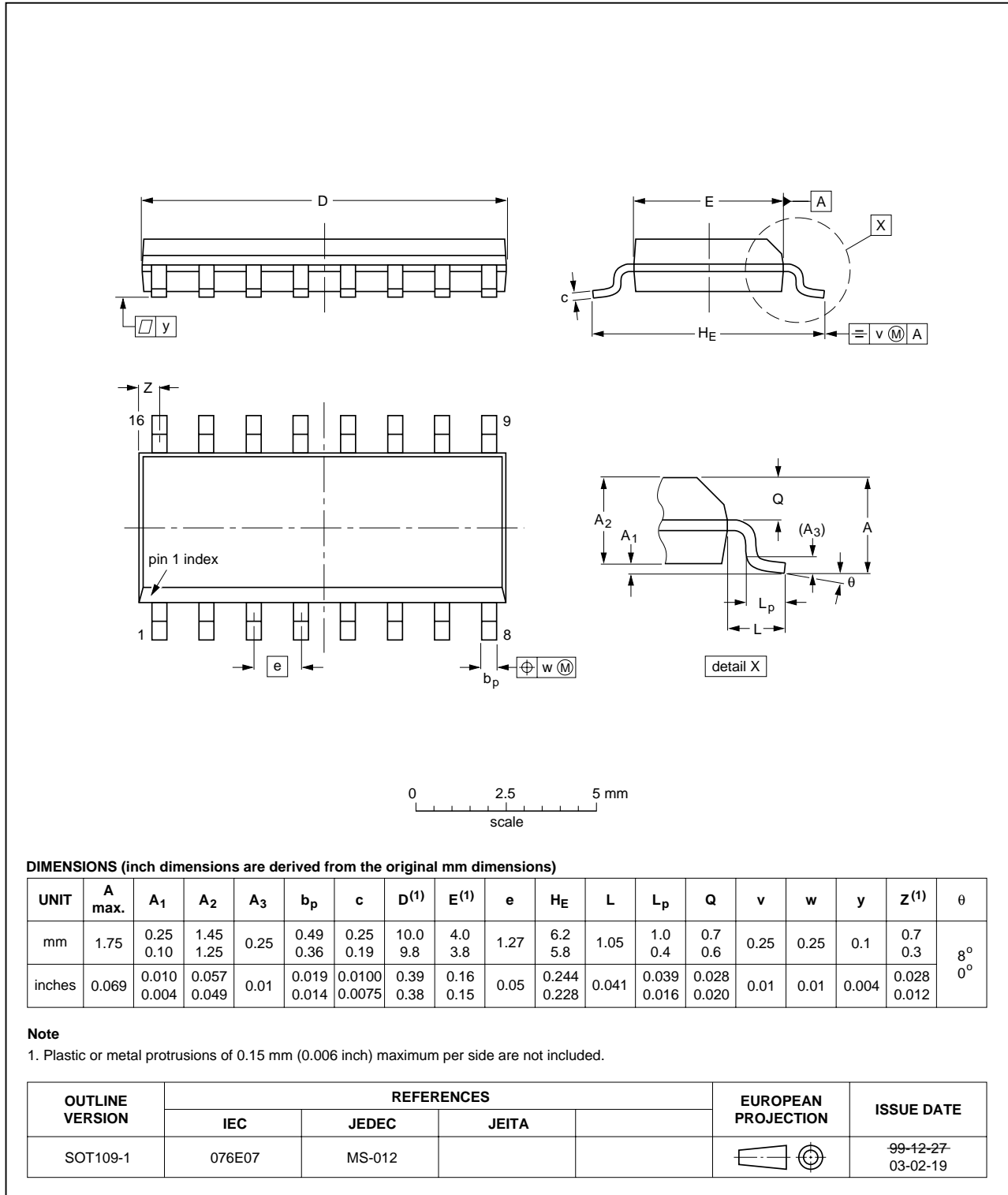


Fig 13. Package outline SOT109-1 (SO16)



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

SOT403-1

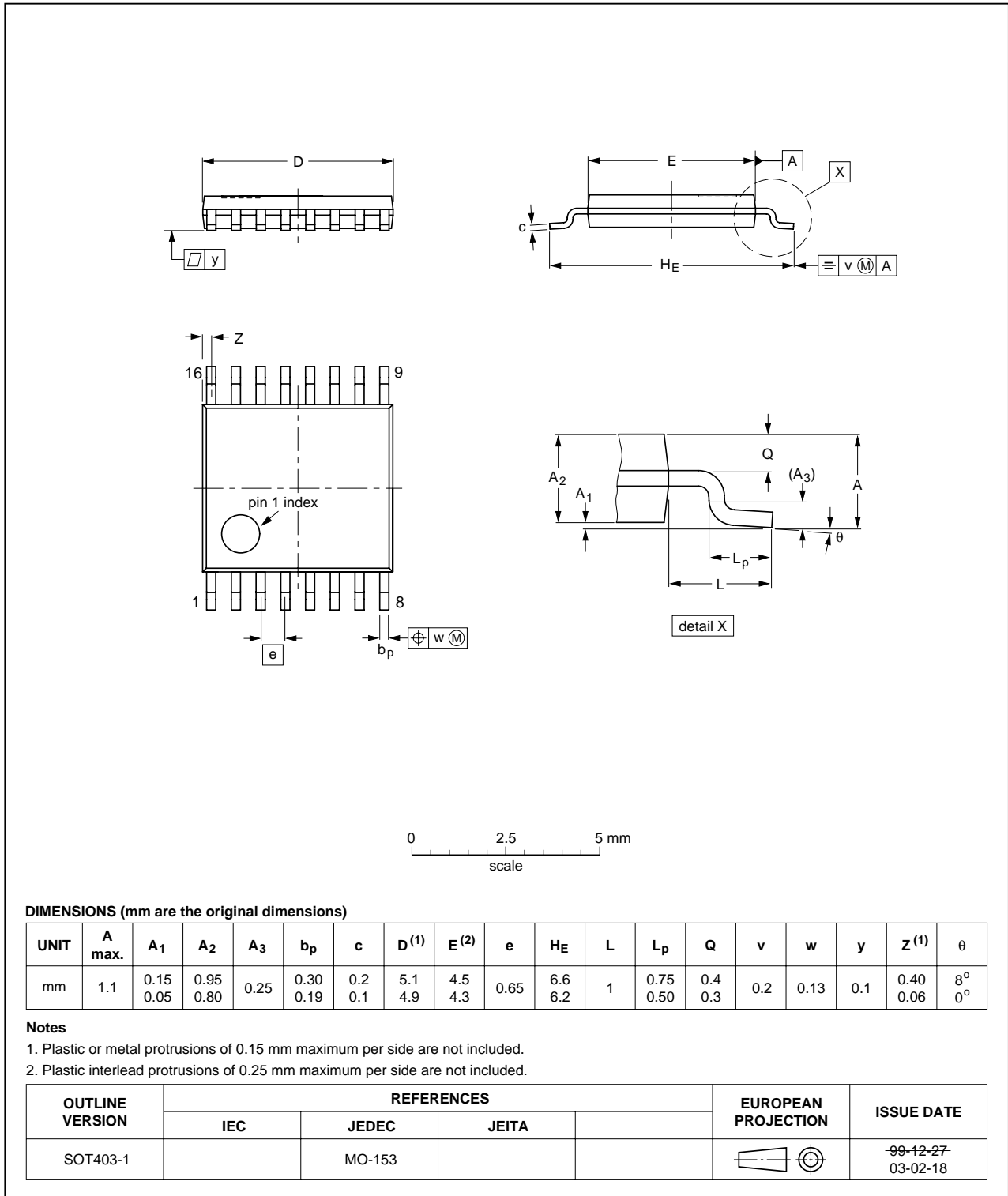


Fig 14. Package outline SOT403-1 (TSSOP16)

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

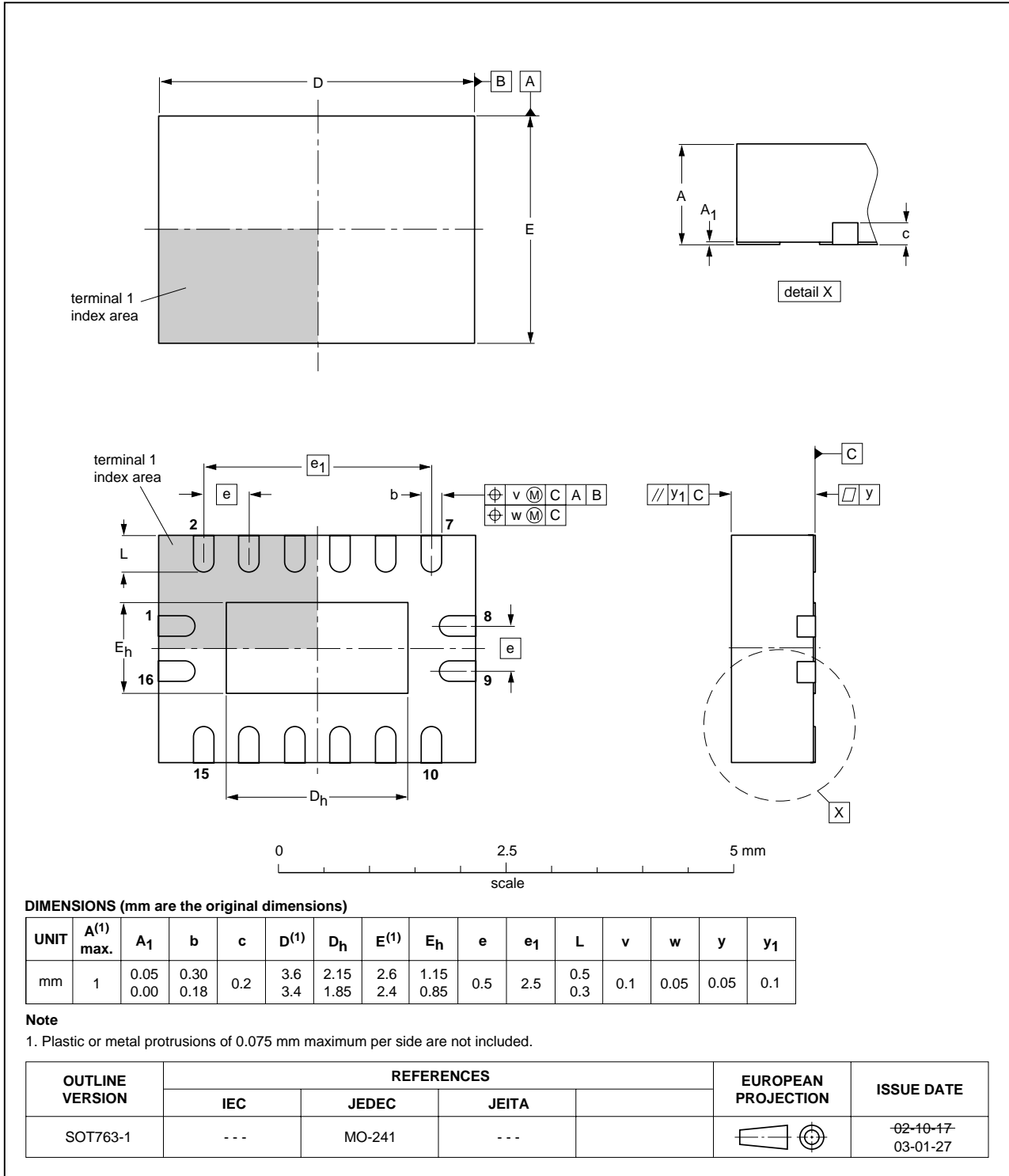


Fig 15. Package outline SOT763-1 (DHVQFN16)

## 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
MM	Machine Model
TTL	Transistor-Transistor Logic

## 14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT123A_2	20080118	Product data sheet	-	74AHC_AHCT123A_1
Modifications:		<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• <a href="#">Section 3</a>: DHVQFN16 package added.</li><li>• <a href="#">Section 7</a>: derating values added for DHVQFN16 package.</li><li>• <a href="#">Section 12</a>: outline drawing added for DHVQFN16 package.</li></ul>		
74AHC_AHCT123A_1	20000315	Product specification	-	-

## 15. Legal information

### 15.1 Data sheet status

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

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

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

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

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Date of release: 18 January 2008

Document identifier: 74AHC\_AHCT123A\_2