

# 74AHC123A-Q100; 74AHCT123A-Q100

Dual retriggerable monostable multivibrator with reset

Rev. 1 — 23 May 2013

Product data sheet

## 1. General description

The 74AHC123A-Q100; 74AHCT123A-Q100 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-Q100; 74AHCT123A-Q100 are dual retriggerable monostable multivibrators with output pulse width control by three methods. The selection of an external resistor ( $R_{ext}$ ) and capacitor ( $C_{ext}$ ) program the basic pulse time. 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 (nA) or the active HIGH-going edge input (nB). By repeating this process, the output pulse period ( $nQ = HIGH$ ,  $n\bar{Q} = LOW$ ) can be made as long as desired. Alternatively an output delay can be terminated at any time by a LOW-going edge on input  $n\bar{R}D$ , which also inhibits the triggering.

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

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - ◆ Specified from  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$  and from  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- 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-Q100 only: operates with CMOS input levels
- For 74AHCT123A-Q100 only: operates with TTL input levels
- ESD protection:

**nexperia**

- ◆ MIL-STD-883, method 3015 exceeds 2000 V
- ◆ HBM JESD22-A114F exceeds 2000 V
- ◆ MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Multiple package options

### 3. Ordering information

Table 1. Ordering information

Type number	Package	Temperature range	Name	Description	Version
74AHC123AD-Q100	SO16	−40 °C to +125 °C		plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74AHCT123AD-Q100					
74AHC123APW-Q100	TSSOP16	−40 °C to +125 °C		plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74AHCT123APW-Q100					
74AHC123ABQ-Q100	DHVQFN16	−40 °C to +125 °C		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
74AHCT123ABQ-Q100					

### 4. Functional diagram

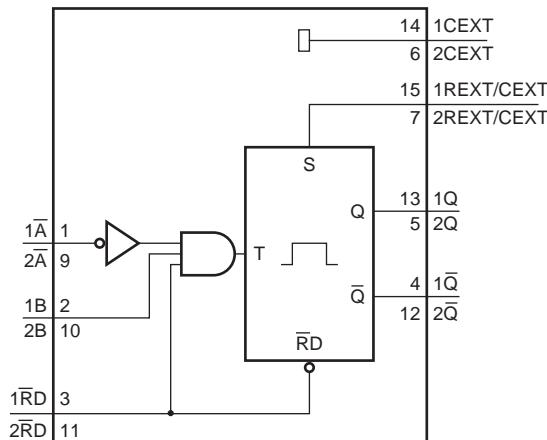


Fig 1. Logic symbol

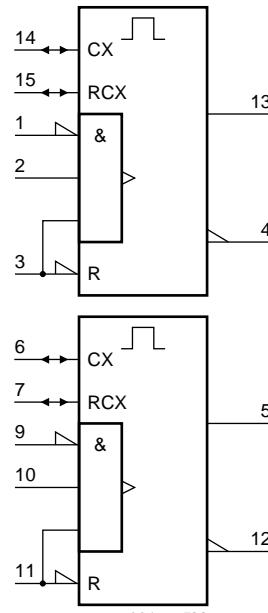


Fig 2. IEC logic symbol

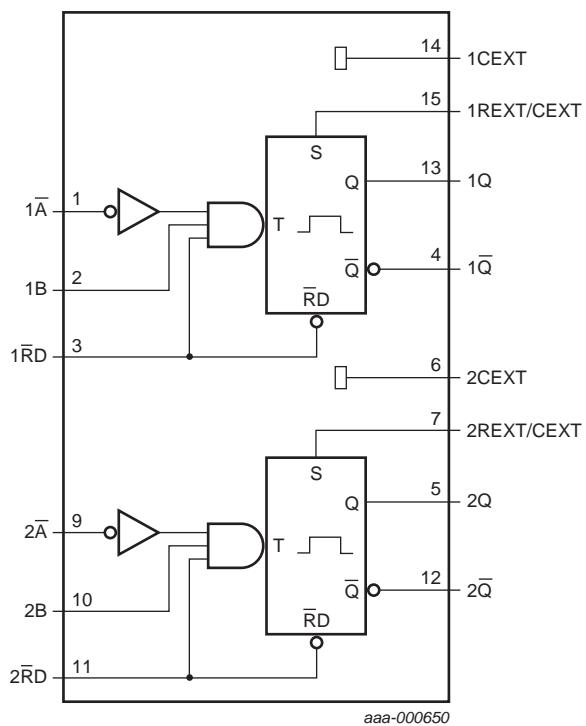
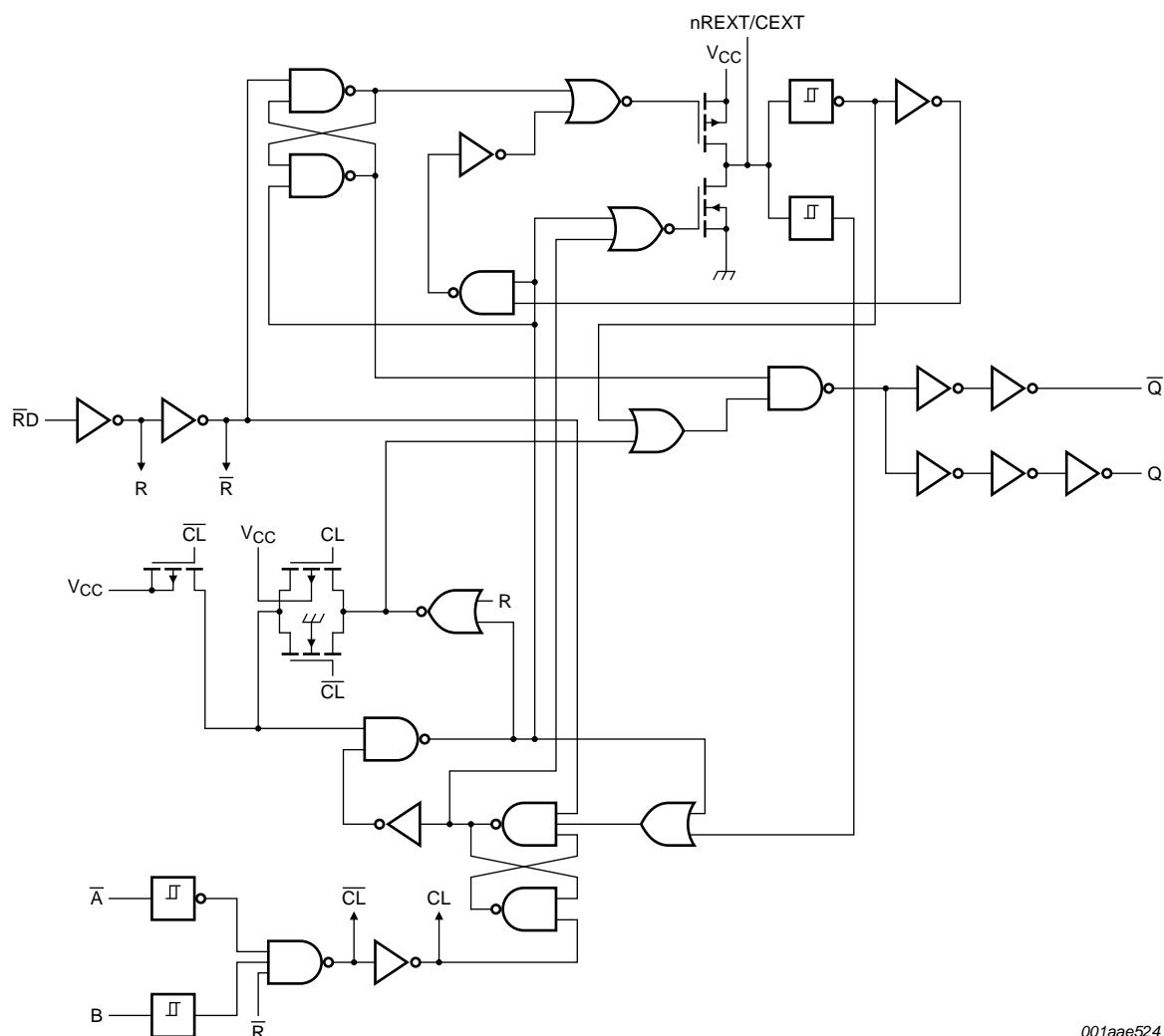


Fig 3. Functional diagram



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

**Fig 4. Functional diagram**

## 5. Pinning information

### 5.1 Pinning

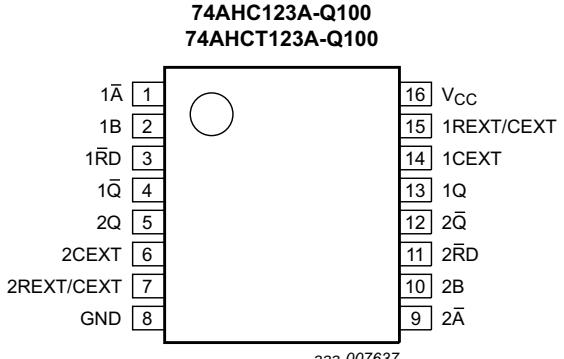
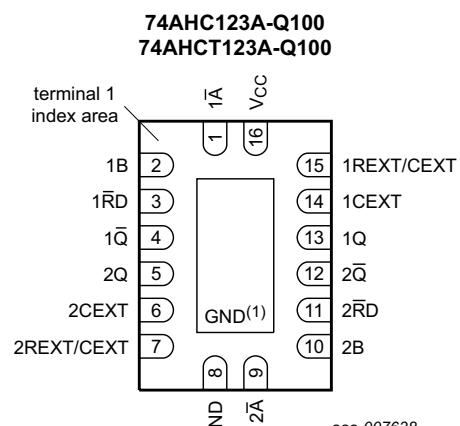
 <p>74AHC123A-Q100 74AHCT123A-Q100</p> <p>aaa-007637</p>	 <p>74AHC123A-Q100 74AHCT123A-Q100</p> <p>terminal 1 index area</p> <p>1Ā V<sub>CC</sub></p> <p>1B 15 1REXT/CEXT 15 1CEXT</p> <p>1RD 3 1Ā 14 1Q</p> <p>1Q 4 1Q 13 2Q</p> <p>2Q 5 2Q 12 2Ā</p> <p>2CEXT 6 2CEXT 11 2RD</p> <p>2REXT/CEXT 7 2REXT/CEXT 10 2B</p> <p>GND 8 GND(1) GND 8</p> <p>2Ā 9 2Ā 9</p> <p>aaa-007638</p> <p>Transparent top view</p> <p>(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.</p>
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Fig 5. Pin configuration SO16, TSSOP16

Fig 6. Pin configuration DHVQFN16

### 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
1Ā	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)
2Ā	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<sup>[1]</sup>

Input			Output	
$nRD$	$nA$	$nB$	$nQ$	$n\bar{Q}$
L	X	X	L	H
X	H	X	$\underline{L}$ <sup>[2]</sup>	$\underline{H}$ <sup>[2]</sup>
X	X	L	$\underline{L}$ <sup>[2]</sup>	$\underline{H}$ <sup>[2]</sup>
H	L	$\uparrow$	$\square$	$\square$
H	$\downarrow$	H	$\square$	$\square$
$\uparrow$	L	H	$\square$	$\square$

[1] H = HIGH voltage level;

L = LOW voltage level;

X = don't care;

$\uparrow$  = LOW-to-HIGH transition;

$\downarrow$  = HIGH-to-LOW transition;

$\square$  = one HIGH level output pulse;

$\square$  = one LOW level output pulse.

[2] If the monostable multivibrator was triggered before this condition was established, the pulse continues 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
$V_{CC}$	supply voltage		-0.5	+7.0	V
$V_I$	input voltage		-0.5	+7.0	V
$I_{IK}$	input clamping current	$V_I < -0.5$ V	<sup>[1]</sup> -20	-	mA
$I_{OK}$	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	<sup>[1]</sup> -	$\pm 20$	mA
$I_O$	output current	$V_O = -0.5$ V to $(V_{CC} + 0.5$ V)	-	$\pm 25$	mA
$I_{CC}$	supply current		-	75	mA
$I_{GND}$	ground current		-75	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °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]  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[3]  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

[4]  $P_{tot}$  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-Q100			74AHCT123A-Q100			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0	-	5.5	0	-	5.5	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	V <sub>CC</sub> = 3.3 V ± 0.3 V	-	-	100	-	-	-	ns/V
		V <sub>CC</sub> = 5.0 V ± 0.5 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-Q100</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V <sub>CC</sub> = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V <sub>CC</sub> = 5.5 V	-	-	1.65	-	1.65	-	1.65	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> = −50 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = −50 μA; V <sub>CC</sub> = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I <sub>O</sub> = −50 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = −4.0 mA; V <sub>CC</sub> = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I <sub>O</sub> = −8.0 mA; V <sub>CC</sub> = 4.5 V	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>								
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V								
		nREXT/CEXT	[1]	-	-	±0.25	-	±2.5	-	±10.0 μA
		pins nA, nB, nRD	-	-	±0.1	-	±1.0	-	±2.0	μA

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-Q100</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]	-	-	±0.25	-	±2.5	-	±10.0 μA
		pins nA, nB, nRD; 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 nREXT/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-Q100</b>										
$t_{pd}$	propagation delay	$n\bar{A}$ and $nB$ to $nQ$ and $n\bar{Q}$ ; <a href="#">[2]</a> see <a href="#">Figure 7</a>								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$								
		$C_L = 15 \text{ pF}$	-	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
		$n\bar{R}D$ to $nQ$ and $n\bar{Q}$ ; <a href="#">[2]</a> see <a href="#">Figure 7</a>								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$								
		$C_L = 15 \text{ pF}$	-	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
		$n\bar{R}D$ to $nQ$ and $n\bar{Q}$ (reset); <a href="#">[2]</a> see <a href="#">Figure 7</a>								
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$								
		$C_L = 15 \text{ pF}$	-	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 <sub>W</sub>	pulse width	inputs; nA = LOW; see <a href="#">Figure 7</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; nB = HIGH; see <a href="#">Figure 7</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; nRD = LOW; see <a href="#">Figure 7</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		outputs; nQ = LOW and nQ = HIGH; C <sub>L</sub> = 50 pF; see <a href="#">Figure 7</a> , <a href="#">Figure 8</a> , <a href="#">Figure 9</a> and <a href="#">Figure 10</a>	[3]							
t <sub>rtrig</sub>	retrigger time	C <sub>ext</sub> = 28 pF; R <sub>ext</sub> = 2 kΩ								
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	115	240	-	300	-	300	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	100	200	-	240	-	240	ns
		C <sub>ext</sub> = 0.01 μF; R <sub>ext</sub> = 10 kΩ								
		V <sub>CC</sub> = 3.0 V to 3.6 V	90	100	110	90	110	85	115	μs
		V <sub>CC</sub> = 4.5 V to 5.5 V	90	100	110	90	110	85	115	μs
		C <sub>ext</sub> = 0.1 μF; R <sub>ext</sub> = 10 kΩ;								
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.9	1	1.1	0.9	1.1	0.85	1.15	ms
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.9	1	1.1	0.9	1.1	0.85	1.15	ms
		nA to nB; C <sub>ext</sub> = 100 pF; R <sub>ext</sub> = 1 kΩ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
C <sub>PD</sub>	power dissipation capacitance	V <sub>CC</sub> = 3.0 V to 3.6 V	-	60	-	-	-	-	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	39	-	-	-	-	-	ns
		nA to nB; C <sub>ext</sub> = 0.01 μF; R <sub>ext</sub> = 1 kΩ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>								
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	1.5	-	-	-	-	-	μs
		V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	-	-	-	-	-	μs
		C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>	[4]		-	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-Q100</b>										
$t_{pd}$	propagation delay	$n\bar{A}$ and $nB$ to $nQ$ and $n\bar{Q}$ ; <a href="#">[2]</a> $V_{CC} = 4.5$ V to 5.5 V $C_L = 15$ pF $C_L = 50$ pF	-	5.0	12.0	1.0	14.0	1.0	15.5	ns
		$n\bar{R}D$ to $nQ$ and $n\bar{Q}$ ; <a href="#">[2]</a> $V_{CC} = 4.5$ V to 5.5 V $C_L = 15$ pF $C_L = 50$ pF	-	7.1	14.0	1.0	16.0	1.0	17.5	ns
		$n\bar{R}D$ to $nQ$ and $n\bar{Q}$ (reset); <a href="#">[2]</a> $V_{CC} = 4.5$ V to 5.5 V $C_L = 15$ pF $C_L = 50$ pF	-	5.2	12.9	1.0	15.0	1.0	16.5	ns
			-	7.5	14.9	1.0	17.0	1.0	18.5	ns
$t_W$	pulse width	inputs; $n\bar{A}$ = LOW; $C_L = 50$ pF; <a href="#">see Figure 7</a> $V_{CC} = 4.5$ V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $nB$ = HIGH; $C_L = 50$ pF; <a href="#">see Figure 7</a> $V_{CC} = 4.5$ V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		inputs; $n\bar{R}D$ = LOW; $C_L = 50$ pF; <a href="#">see Figure 7</a> $V_{CC} = 4.5$ V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		outputs; $n\bar{Q}$ = LOW and $nQ$ = HIGH; $C_L = 50$ pF; $C_{ext} = 28$ pF; $R_{ext} = 2$ k $\Omega$ ; <a href="#">see Figure 7</a> , <a href="#">Figure 8</a> , <a href="#">Figure 9</a> and <a href="#">Figure 10</a> $V_{CC} = 4.5$ V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
		$C_{ext} = 0.01$ $\mu$ F; $R_{ext} = 10$ k $\Omega$	-	100	200	-	240	-	240	ns
		$V_{CC} = 4.5$ V to 5.5 V	90	100	110	90	110	85	115	$\mu$ s
		$C_{ext} = 0.1$ $\mu$ F; $R_{ext} = 10$ k $\Omega$	$V_{CC} = 4.5$ V to 5.5 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](#).

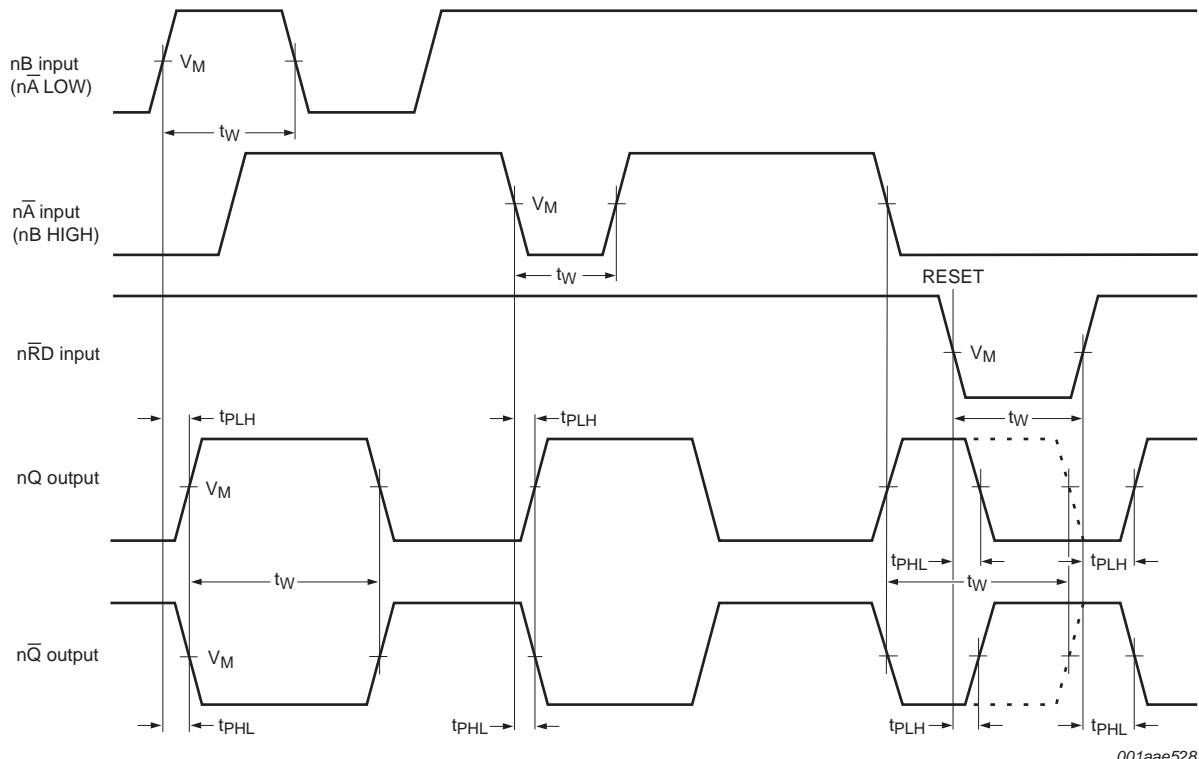
Symbol	Parameter	Conditions	25 °C			−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
t <sub>trig</sub>	retrigger time	nA to nB; C <sub>ext</sub> = 100 pF; R <sub>ext</sub> = 1 kΩ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>				60	-	-	-	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	-							
C <sub>PD</sub>	power dissipation capacitance	nA to nB; C <sub>ext</sub> = 0.01 μF; R <sub>ext</sub> = 1 kΩ; C <sub>L</sub> = 50 pF; see <a href="#">Figure 8</a> and <a href="#">Figure 10</a>				1.5	-	-	-	μs
		V <sub>CC</sub> = 4.5 V to 5.5 V	-							
<b>External components</b>										
R <sub>ext</sub>	external resistance	V <sub>CC</sub> = 2.0 V	5	-	-	-	-	-	-	kΩ
		V <sub>CC</sub> > 3.0 V	1	-	-	-	-	-	-	kΩ
C <sub>ext</sub>	external capacitance	V <sub>CC</sub> = 2.0 V	[5]	-	-	-	-	-	-	pF
		V <sub>CC</sub> > 3.0 V	[5]	-	-	-	-	-	-	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 kΩ.[3] For C<sub>ext</sub> ≥ 10 nF, the typical value of the pulse width t<sub>W</sub> (μs) = C<sub>ext</sub> (nF) × R<sub>ext</sub> (kΩ).[4] C<sub>PD</sub> is used to determine the dynamic power dissipation P<sub>D</sub> (μW).

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

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

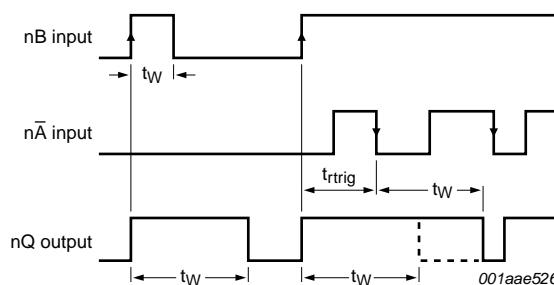


Measurement points are given in [Table 8](#).

**Fig 7. Propagation delay input ( $n\bar{A}$ ,  $nB$ ,  $n\bar{R}D$ ) to output ( $nQ$ ,  $n\bar{Q}$ )**

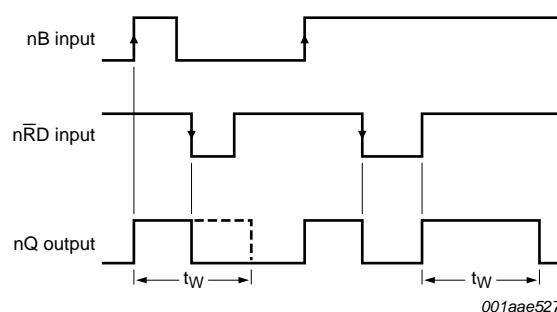
**Table 8. Measurement points**

Type	Input	Output
	$V_M$	$V_M$
74AHC123A-Q100	$0.5V_{CC}$	$0.5V_{CC}$
74AHCT123A-Q100	1.5 V	$0.5V_{CC}$



$n\bar{R}D = \text{HIGH}$

**Fig 8. Output pulse control using retrigger pulse**



$n\bar{A}$  = LOW

Fig 9. Output pulse control using reset input  $n\bar{R}D$

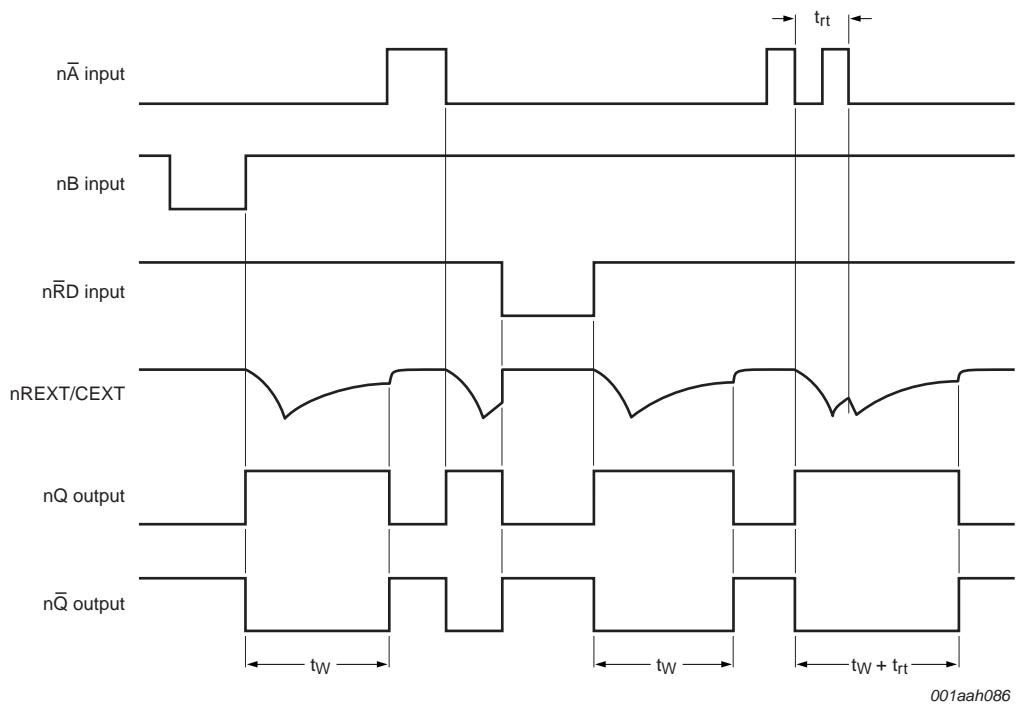


Fig 10. Input and output timing

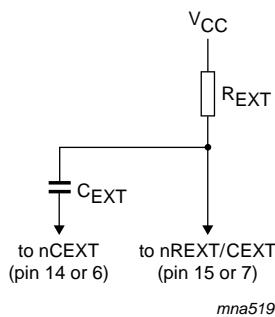
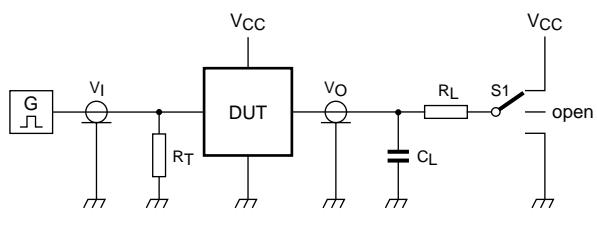
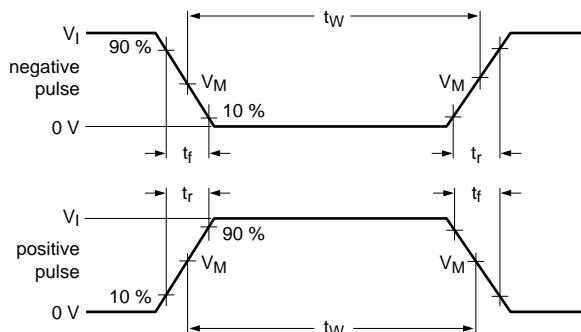


Fig 11. Timing component connections



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

Definitions test circuit:

$R_T$  = Termination resistance should be equal to output impedance  $Z_0$  of the pulse generator

$C_L$  = Load capacitance including jig and probe capacitance

$R_L$  = Load resistor

$S_1$  = Test selection switch

Fig 12. Load circuitry for switching times

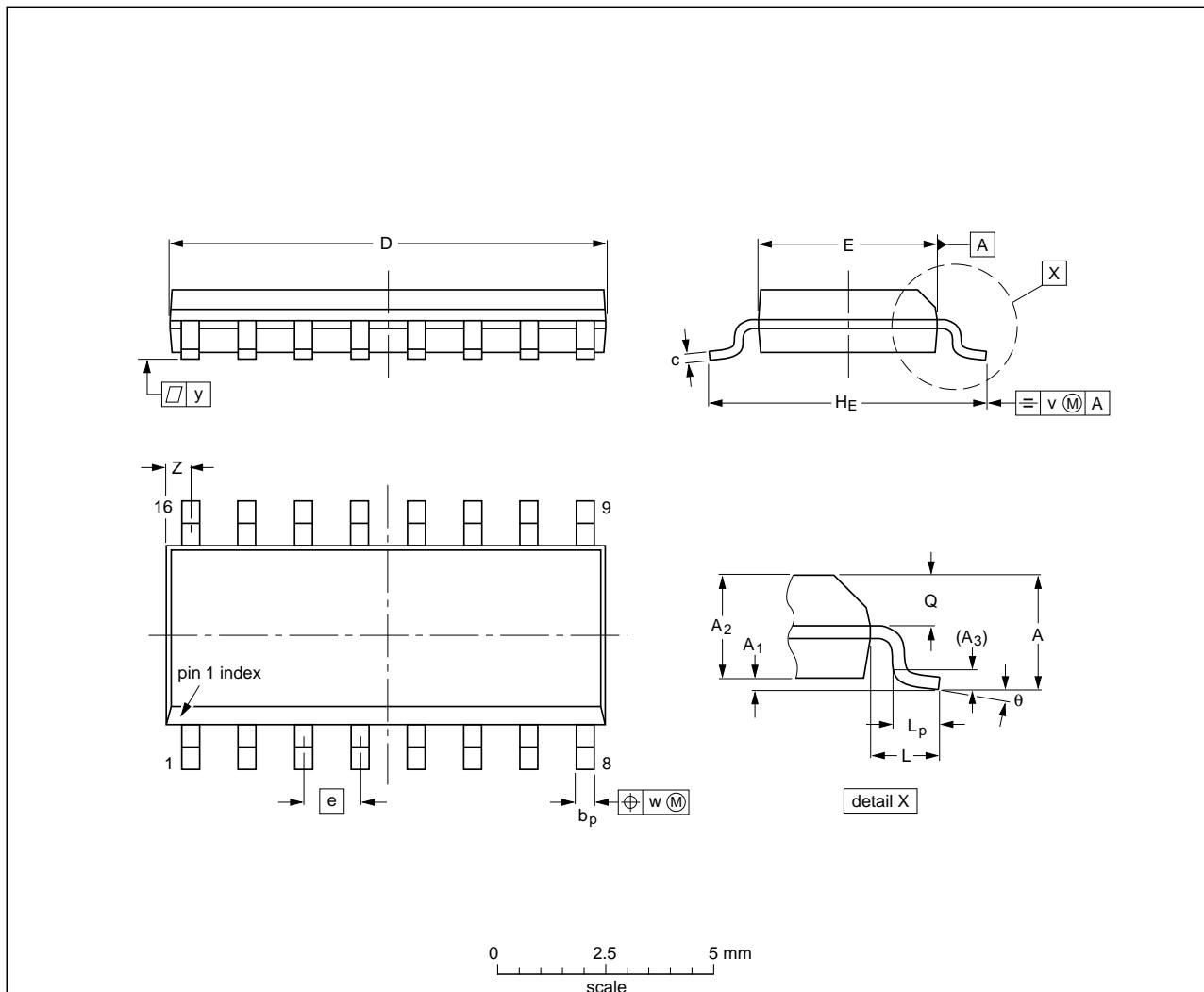
Table 9. Test data

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-Q100	$V_{CC}$	3.0 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74AHCT123A-Q100	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



### DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75 0.10	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069 0.004	0.010 0.049	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	0°

### Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				99-12-27 03-02-19

Fig 13. Package outline SOT109-1 (SO16)

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

SOT403-1

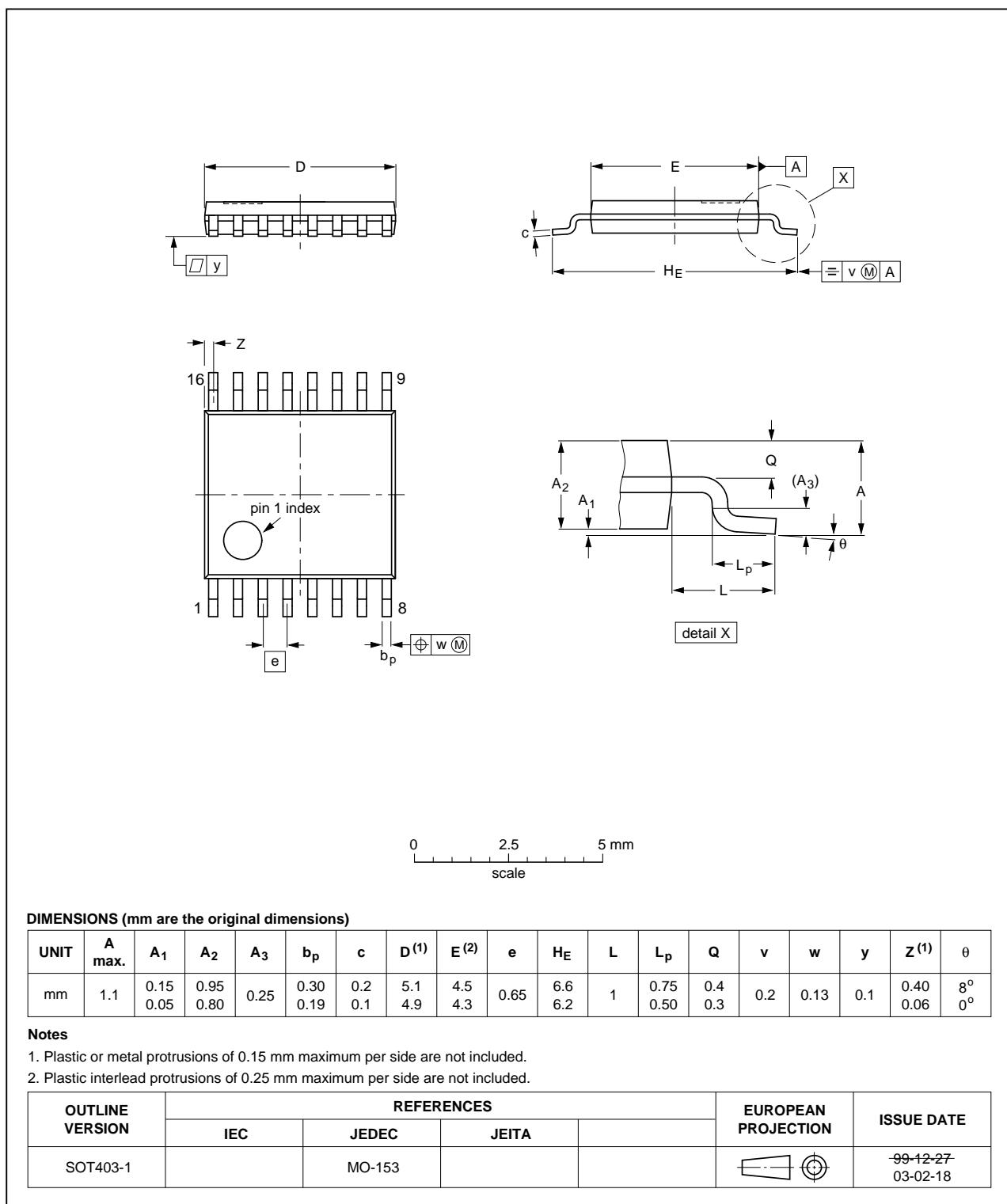
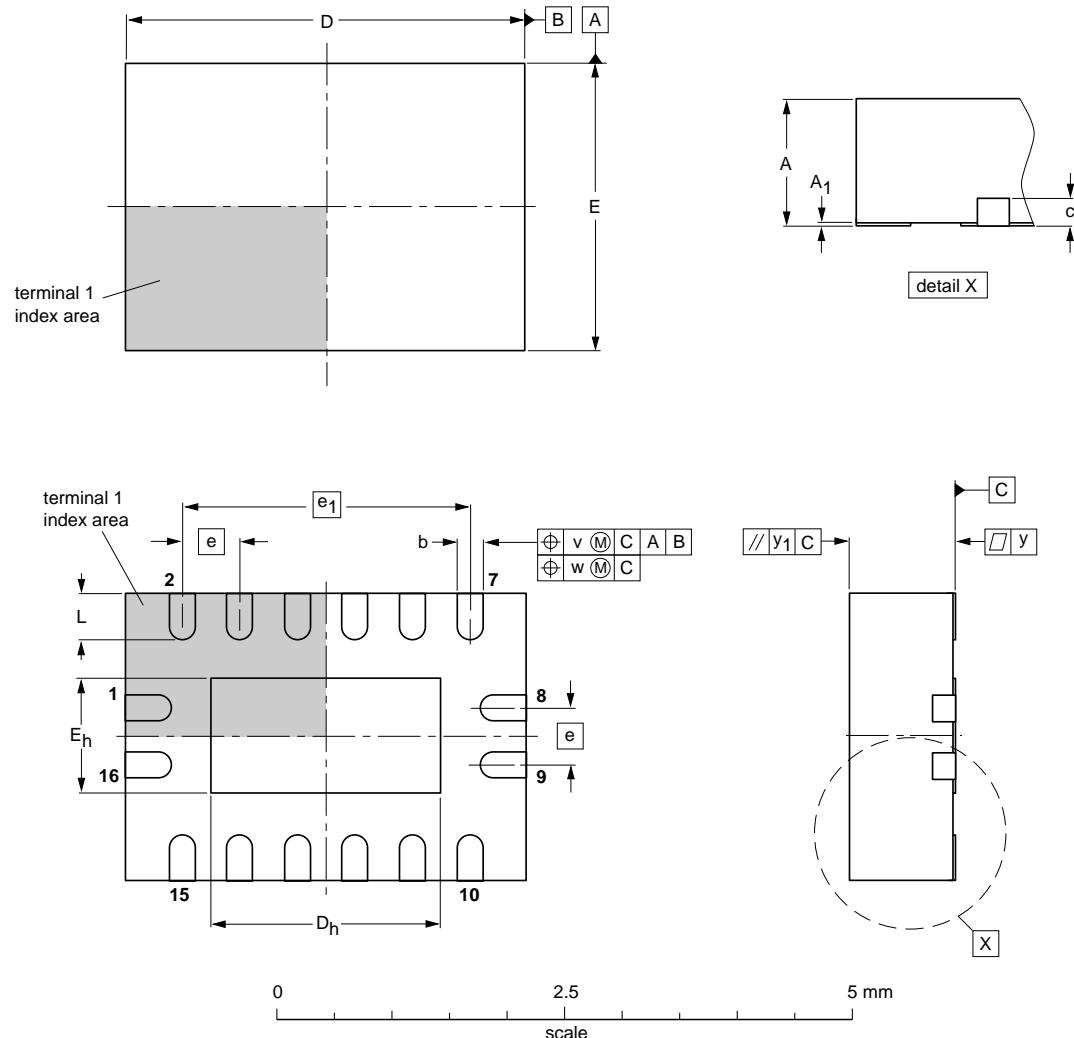


Fig 14. Package outline SOT403-1 (TSSOP16)

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



## DIMENSIONS (mm are the original dimensions)

UNIT	A <sup>(1)</sup> max.	A <sub>1</sub>	b	c	D <sup>(1)</sup>	D <sub>h</sub>	E <sup>(1)</sup>	E <sub>h</sub>	e	e <sub>1</sub>	L	v	w	y	y <sub>1</sub>
mm	1	0.05 0.00	0.30 0.18	0.2	3.6 3.4	2.15 1.85	2.6 2.4	1.15 0.85	0.5	2.5	0.5 0.3	0.1	0.05	0.05	0.1

## Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT763-1	---	MO-241	---			-02-10-17- 03-01-27

Fig 15. Package outline SOT763-1 (DHVQFN16)

## 13. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
CDM	Charge Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
LSTTL	Low-power Schottky Transistor-Transistor Logic
MIL	Military
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_Q100 v.1	20130523	Product data sheet	-	-

## 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.nexperia.com>.

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## 17. Contents

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<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Ordering information</b> .....	<b>2</b>
<b>4</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>5</b>	<b>Pinning information</b> .....	<b>5</b>
5.1	Pinning .....	5
5.2	Pin description .....	5
<b>6</b>	<b>Functional description</b> .....	<b>6</b>
<b>7</b>	<b>Limiting values</b> .....	<b>6</b>
<b>8</b>	<b>Recommended operating conditions</b> .....	<b>7</b>
<b>9</b>	<b>Static characteristics</b> .....	<b>7</b>
<b>10</b>	<b>Dynamic characteristics</b> .....	<b>9</b>
<b>11</b>	<b>Waveforms</b> .....	<b>13</b>
<b>12</b>	<b>Package outline</b> .....	<b>16</b>
<b>13</b>	<b>Abbreviations</b> .....	<b>19</b>
<b>14</b>	<b>Revision history</b> .....	<b>19</b>
<b>15</b>	<b>Legal information</b> .....	<b>20</b>
15.1	Data sheet status .....	20
15.2	Definitions.....	20
15.3	Disclaimers.....	20
15.4	Trademarks.....	21
<b>16</b>	<b>Contact information</b> .....	<b>21</b>
<b>17</b>	<b>Contents</b> .....	<b>22</b>

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