

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74AC123A

## Dual Retriggerable Resettable Multivibrator

REJ03D0245-0200Z  
 (Previous ADE-205-365 (Z))  
 Rev.2.00  
 Jul.16.2004

### Description

Each half of the HD74AC123A features retriggerable capability, complementary dc level triggering and overriding Direct Clear. When a circuit is in the quasi-stable (delay) state, another trigger applied to the inputs (per the Truth Table) will cause the delay period to start again, without disturbing the outputs. By repeating this process, the output pulse period (Q High,  $\bar{Q}$  Low) can be made as long as desired. Alternatively, a delay period can be terminated at any time by a Low signal on  $\bar{C}_D$ , which also inhibits triggering. An internal connection from  $\bar{C}_D$  to the input gate makes it possible to trigger the circuit by a positive-going signal on  $\bar{C}_D$ , as shown in the Truth Table. For timing capacitor values greater than 1000 pF, the output pulse width is defined as follows.

Where  $t_w$  is in ns,  $R_X$  is in k $\Omega$  and  $C_X$  is in pF.

$$t_w = R_X C_X$$

### Features

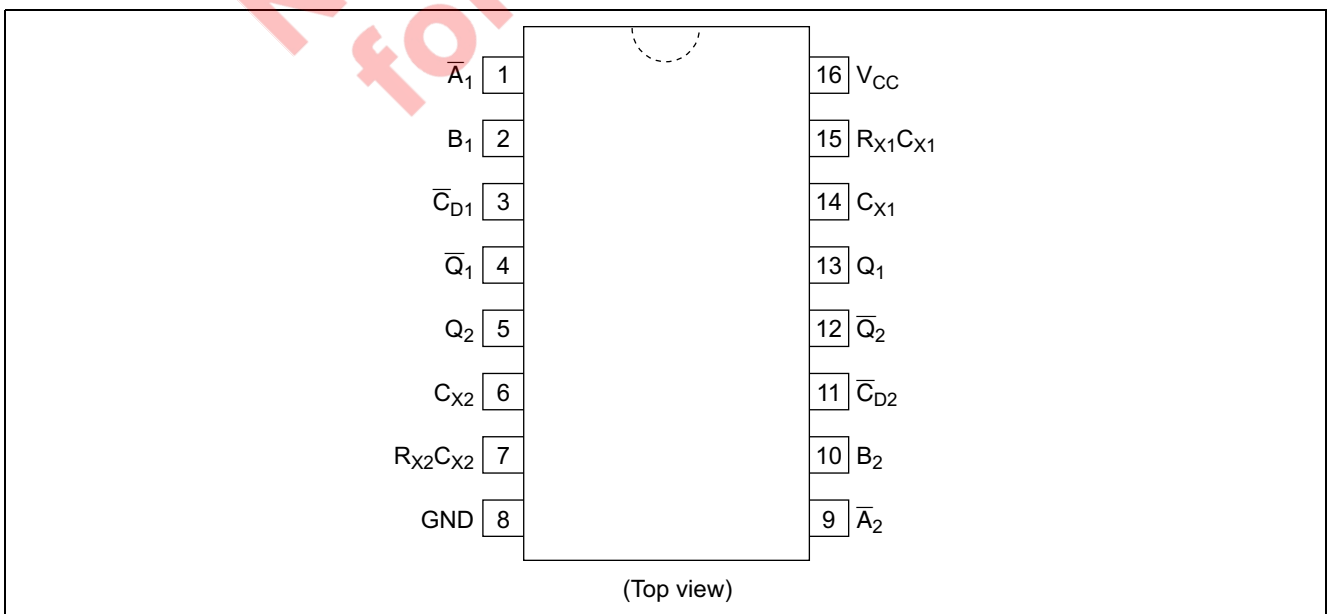
- Outputs Source/Sink 24 mA
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC123AP	DIP-16 pin	DP-16E, -16FV	P	—
HD74AC123AFPEL	SOP-16 pin (JEITA)	FP-16DAV	FP	EL (2,000 pcs/reel)
HD74AC123ARPEL	SOP-16 pin (JEDEC)	FP-16DNV	RP	EL (2,500 pcs/reel)

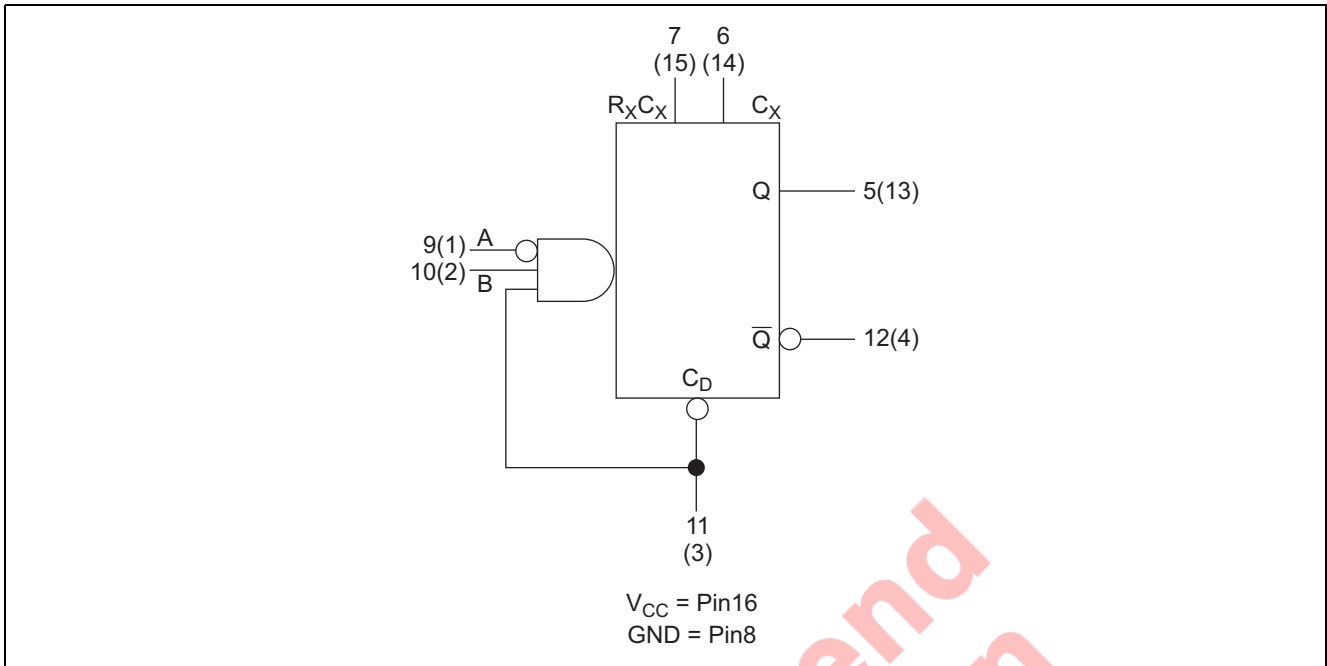
Notes: 1. Please consult the sales office for the above package availability.

2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

### Pin Arrangement



Logic Symbol



Pin Names

- $\overline{A}_1, \overline{A}_2$     Trigger Inputs (Active Falling Edge)
- $B_1, B_2$         Trigger Inputs (Active Rising Edge)
- $\overline{C}_{D1}, \overline{C}_{D2}$     Direct Clear Inputs (Active Low)
- $Q_1, Q_2$         Positive Pulse Outputs
- $\overline{Q}_1, \overline{Q}_2$      Negative Pulse Outputs

Triggering Truth Table

Inputs			Response
A	B	$\overline{C}_D$	
X	X	L	No trigger
	L	X	No trigger
	H	H	Trigger
H		X	No trigger
L		H	Trigger
L	H		Trigger

- H : High Voltage Level
- L : Low Voltage Level
- X : Immaterial
- : Low-to-High Transition
- : High-to-Low Transition

### Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	-0.5 to 7	V	
DC input diode current	$I_{IK}$	-20	mA	$V_I = -0.5V$
		20	mA	$V_I = V_{CC}+0.5V$
DC input voltage	$V_I$	-0.5 to $V_{CC}+0.5$	V	
DC output diode current	$I_{OK}$	-50	mA	$V_O = -0.5V$
		50	mA	$V_O = V_{CC}+0.5V$
DC output voltage	$V_O$	-0.5 to $V_{CC}+0.5$	V	
DC output source or sink current	$I_O$	$\pm 50$	mA	
DC $V_{CC}$ or ground current per output pin	$I_{CC}, I_{GND}$	$\pm 50$	mA	
Storage temperature	$T_{stg}$	-65 to +150	°C	

### Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	2 to 6	V	
Input and output voltage	$V_I, V_O$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to +85	°C	
Input rise and fall time (except Schmitt inputs) $V_{IN}$ 30% to 70% $V_{CC}$	tr, tf	8	ns/V	$V_{CC} = 3.0V$
				$V_{CC} = 4.5 V$
				$V_{CC} = 5.5 V$

### DC Characteristics

Item	Sym- bol	Vcc (V)	$T_a = 25^\circ C$			$T_a = -40 \text{ to } +85^\circ C$		Unit	Condition	
			min.	typ.	max.	min.	max.			
Input Voltage	$V_{IH}$	3.0	2.1	1.5	—	2.1	—	V	$V_{OUT} = 0.1 V \text{ or } V_{CC} - 0.1 V$	
		4.5	3.15	2.25	—	3.15	—			
		5.5	3.85	2.75	—	3.85	—			
	$V_{IL}$	3.0	—	1.50	0.9	—	0.9		$V_{OUT} = 0.1 V \text{ or } V_{CC} - 0.1 V$	
		4.5	—	2.25	1.35	—	1.35			
		5.5	—	2.75	1.65	—	1.65			
Output voltage	$V_{OH}$	3.0	2.9	2.99	—	2.9	—	V	$V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OUT} = -50 \mu A$	
		4.5	4.4	4.49	—	4.4	—			
		5.5	5.4	5.49	—	5.4	—			
		3.0	2.58	—	—	2.48	—			$V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
		4.5	3.94	—	—	3.80	—			
		5.5	4.94	—	—	4.80	—			
	$V_{OL}$	3.0	—	0.002	0.1	—	0.1		$V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OUT} = 50 \mu A$	
		4.5	—	0.001	0.1	—	0.1			
		5.5	—	0.001	0.1	—	0.1			
		3.0	—	—	0.32	—	0.37			$V_{IN} = V_{IL} \text{ or } V_{IH}$ $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$
		4.5	—	—	0.32	—	0.37			
		5.5	—	—	0.32	—	0.37			
Input leakage current	$I_{IN}$	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu A$	$V_{IN} = V_{CC} \text{ or } GND$	
Dynamic output current*	$I_{OLD}$	5.5	—	—	—	86	—	mA	$V_{OLD} = 1.1 V$	
	$I_{OHD}$	5.5	—	—	—	-75	—	mA	$V_{OHD} = 3.85 V$	
Quiescent supply current	$I_{CC}$	5.5	—	—	130	—	220	$\mu A$	$V_{IN} = V_{CC} \text{ or } ground$	

\*Maximum test duration 2.0 ms, one output loaded at a time.

**AC Characteristics: HD74AC123A**

Item	Symbol	V <sub>CC</sub> (V)*1	Ta = +25°C C <sub>L</sub> = 50 pF			Ta = -40°C to +85°C C <sub>L</sub> = 50 pF		Unit	Condition
			Min	Typ	Max	Min	Max		
Propagation delay A̅ or B to Q	t <sub>PLH</sub>	3.3	1.0	—	19.0	1.0	22.0	ns	Cext = 0 pF Rext = 5 kΩ
		5.0	1.0	—	15.0	1.0	17.0		
Propagation delay A or B to Q̅	t <sub>PHL</sub>	3.3	1.0	—	19.0	1.0	22.0	ns	
		5.0	1.0	—	15.0	1.0	17.0		
Propagation delay C̅ <sub>Dn</sub> to Q̅	t <sub>PLH</sub>	3.3	1.0	—	15.0	1.0	18.0	ns	
		5.0	1.0	—	12.0	1.0	13.5		
Propagation delay C̅ <sub>Dn</sub> to Q	t <sub>PHL</sub>	3.3	1.0	—	15.0	1.0	18.0	ns	
		5.0	1.0	—	12.0	1.0	13.5		

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

**AC Operating Requirements: HD74AC123A**

Item	Symbol	V <sub>CC</sub> (V)*1	Ta = +25°C C <sub>L</sub> = 50 pF		Ta = -40°C to +85°C C <sub>L</sub> = 50 pF		Unit	Condition
			Typ	Guaranteed Minimum	Typ	Guaranteed Minimum		
Pulse width A̅ or B or C̅ <sub>Dn</sub>	t <sub>w</sub>	3.3	—	5.0	7.0	ns	Cext = 0 pF Rext = 5 kΩ	
		5.0	—	4.5	5.0			
Recovery time C̅ <sub>Dn</sub> to A or B	t <sub>rec</sub>	3.3	—	2.0	2.0	ns		
		5.0	—	2.0	2.0			

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

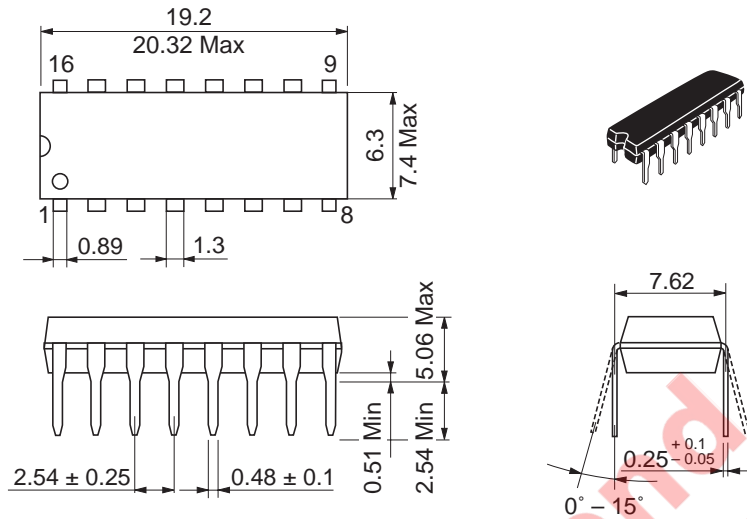
Item	Symbol	V <sub>CC</sub> (V)*1	Ta = +25°C C <sub>L</sub> = 50 pF			Ta = -40°C to +85°C C <sub>L</sub> = 50 pF		Unit	Condition
			Min	Typ	Max	Min	Max		
Output pulse width	T <sub>WQ</sub>	3.3	—	—	—	—	ms	Cext = 0.1 μF Rext = 10 kΩ	
		5.0	0.90	—	1.10	0.85			1.15
Minimum output pulse width	T <sub>WQ(min)</sub>	3.3	190	—	350	170	ns		Cext = 28 pF Rext = 2 k
		5.0	160	—	300	140			

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

Cext and Rext should be connected as close to the IC terminals as possible, in order to prevent malfunction.

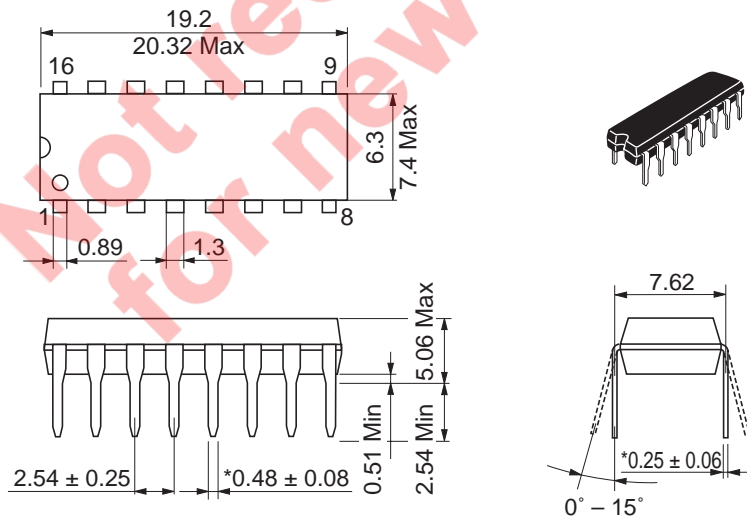
Package Dimensions

As of January, 2003  
Unit: mm



Package Code	DP-16E
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	1.05 g

Unit: mm

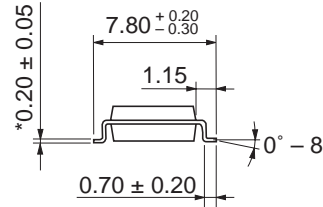
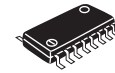
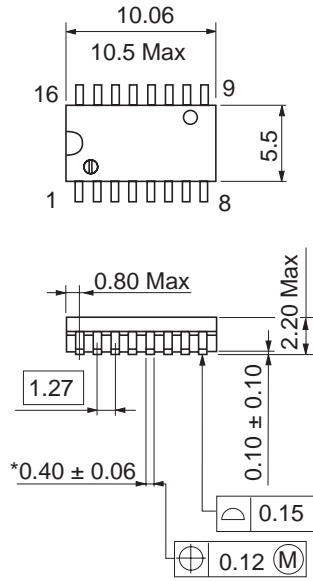


\*NI/Pd/AU Plating

Package Code	DP-16FV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	1.05 g

As of January, 2003

Unit: mm

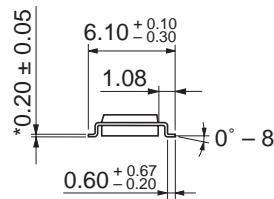
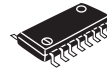
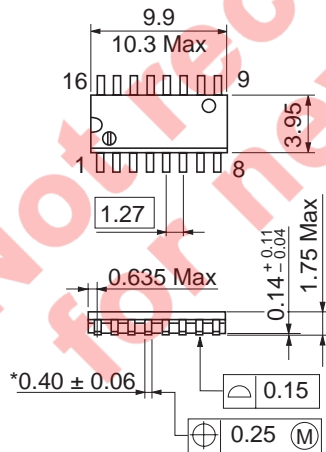


\*Ni/Pd/Au plating

Package Code	FP-16DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.24 g

As of January, 2003

Unit: mm



\*Ni/Pd/Au plating

Package Code	FP-16DNV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.15 g



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