

# SN54AHCT123A, SN74AHCT123A DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATORS

SCLS420G – JUNE 1998 – REVISED APRIL 2003

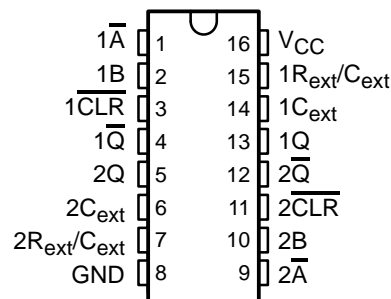
- Inputs Are TTL-Voltage Compatible
- Schmitt-Trigger Circuitry On  $\overline{A}$ , B, and  $\overline{CLR}$  Inputs for Slow Input Transition Rates
- Edge Triggered From Active-High or Active-Low Gated Logic Inputs
- Retriggerable for Very Long Output Pulses
- Overriding Clear Terminates Output Pulse
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

## description/ordering information

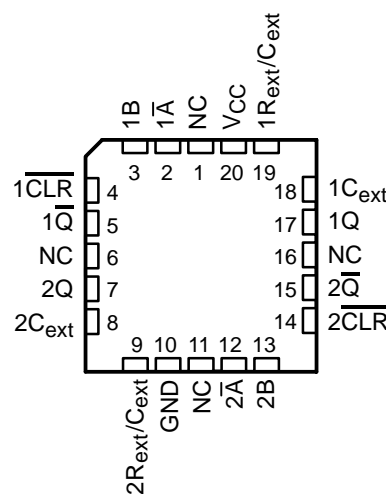
These edge-triggered multivibrators feature output pulse-duration control by three methods. In the first method, the  $\overline{A}$  input is low, and the B input goes high. In the second method, the B input is high, and the  $\overline{A}$  input goes low. In the third method, the  $\overline{A}$  input is low, the B input is high, and the clear ( $\overline{CLR}$ ) input goes high.

The output pulse duration is programmed by selecting external resistance and capacitance values. The external timing capacitor must be connected between  $C_{ext}$  and  $R_{ext}/C_{ext}$  (positive) and an external resistor connected between  $R_{ext}/C_{ext}$  and  $V_{CC}$ . To obtain variable pulse durations, connect an external variable resistance between  $R_{ext}/C_{ext}$  and  $V_{CC}$ . The output pulse duration also can be reduced by taking  $\overline{CLR}$  low.

SN54AHCT123A . . . J OR W PACKAGE  
SN74AHCT123A . . . D, DB, DGV, N, OR PW PACKAGE  
(TOP VIEW)



SN54AHCT123A . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	SN74AHCT123AN	SN74AHCT123AN
	SOIC – D	Tube	SN74AHCT123AD	AHCT123A
		Tape and reel	SN74AHCT123ADR	
	SSOP – DB	Tape and reel	SN74AHCT123ADBR	HB123A
	TSSOP – PW	Tape and reel	SN74AHCT123APWR	HB123A
TVSOP – DGV	Tape and reel	SN74AHCT123ADGVR	HB123A	
–55°C to 125°C	CDIP – J	Tube	SNJ54AHCT123AJ	SNJ54AHCT123AJ
	CFP – W	Tube	SNJ54AHCT123AW	SNJ54AHCT123AW
	LCCC – FK	Tube	SNJ54AHCT123AFK	SNJ54AHCT123AFK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

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## description/ordering information(continued)

Pulse triggering occurs at a particular voltage level and is not directly related to the transition time of the input pulse. The  $\overline{A}$ , B, and  $\overline{CLR}$  inputs have Schmitt triggers with sufficient hysteresis to handle slow input transition rates with jitter-free triggering at the outputs.

Once triggered, the basic pulse duration can be extended by retriggering the gated low-level-active ( $\overline{A}$ ) or high-level-active (B) input. Pulse duration can be reduced by taking  $\overline{CLR}$  low.  $\overline{CLR}$  input can be used to override  $\overline{A}$  or B inputs. The input/output timing diagram illustrates pulse control by retriggering the inputs and early clearing.

The variance in output pulse duration from device to device typically is less than  $\pm 0.5\%$  for given external timing components. An example of this distribution for the 'AHCT123A is shown in Figure 10. Variations in output pulse duration versus supply voltage and temperature are shown in Figure 6.

During power up, Q outputs are in the low state, and  $\overline{Q}$  outputs are in the high state. The outputs are glitch free, without applying a reset pulse.

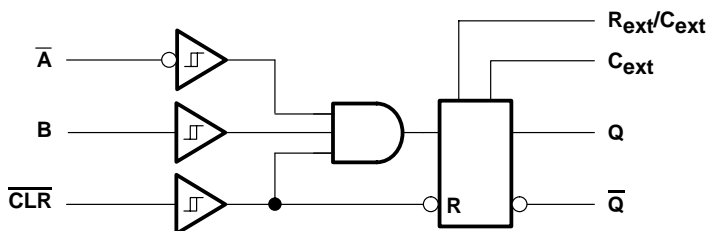
For additional application information on multivibrators, see the application report, *Designing With the SN74AHC123A and SN74AHCT123A*, literature number SCLA014.

**FUNCTION TABLE**  
(each multivibrator)

INPUTS			OUTPUTS	
CLR	$\overline{A}$	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L <sup>†</sup>	H <sup>†</sup>
X	X	L	L <sup>†</sup>	H <sup>†</sup>
H	L	↑		
H	↓	H		
↑	L	H		

† These outputs are based on the assumption that the indicated steady-state conditions at the  $\overline{A}$  and B inputs have been set up long enough to complete any pulse started before the setup.

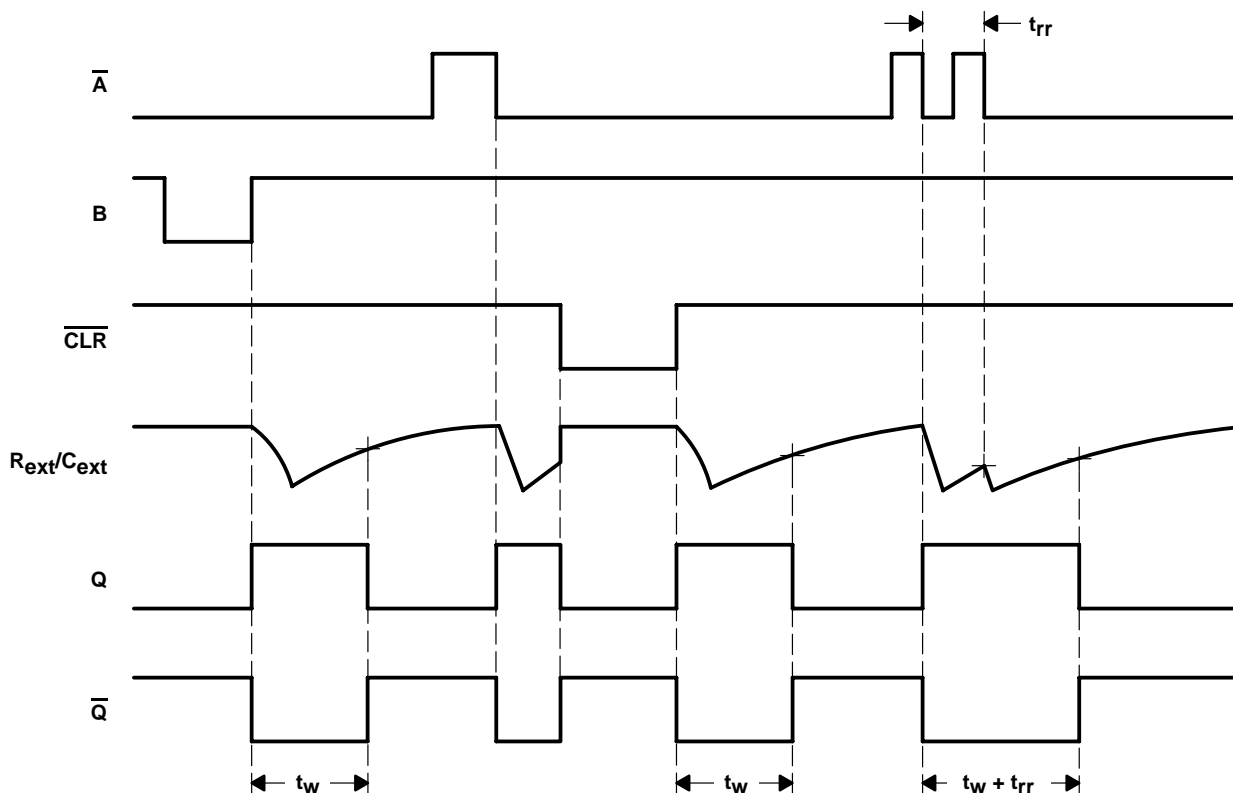
## logic diagram, each multivibrator (positive logic)



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## input/output timing diagram



## absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage range, $V_{CC}$ (see Note 1)	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 2)	–0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND	$\pm 50$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 3):	
D package	73°C/W
DB package	82°C/W
DGV package	120°C/W
N package	67°C/W
PW package	108°C/W
Storage temperature range, $T_{Stg}$	–65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. Voltage values are with respect to the network ground terminal.
  2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
  3. The package thermal impedance is calculated in accordance with JESD 51-7.

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## recommended operating conditions (see Note 4)

		SN54AHCT123A		SN74AHCT123A		UNIT
		MIN	MAX	MIN	MAX	
$V_{CC}$	Supply voltage	4.5	5.5	4.5	5.5	V
$V_{IH}$	High-level input voltage	2		2		V
$V_{IL}$	Low-level input voltage		0.8		0.8	V
$V_I$	Input voltage	0	5.5	0	5.5	V
$V_O$	Output voltage	0	$V_{CC}$	0	$V_{CC}$	V
$I_{OH}$	High-level output current		-8		-8	mA
$I_{OL}$	Low-level output current		8		8	mA
$R_{ext}$	External timing resistance	1k		1k		$\Omega$
$\Delta t/\Delta V_{CC}$	Power-up ramp rate	1		1		ms/V
$T_A$	Operating free-air temperature	-55	125	-40	85	$^{\circ}C$

NOTE 4: Unused  $R_{ext}/C_{ext}$  terminals should be left unconnected. All remaining unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^{\circ}C$			SN54AHCT123A		SN74AHCT123A		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$V_{OH}$	$I_{OH} = -50 \mu A$	4.5 V	4.4	4.5		4.4		4.4	V	
	$I_{OH} = -8 \text{ mA}$		3.94			3.8		3.8		
$V_{OL}$	$I_{OL} = 50 \mu A$	4.5 V			0.1			0.1	V	
	$I_{OL} = 8 \text{ mA}$				0.36		0.5	0.44		
$I_I$	$R_{ext}/C_{ext}^{\dagger}$ $\bar{A}, B,$ and CLR	$V_I = V_{CC}$ or GND			$\pm 0.25$		$\pm 2.5$	$\pm 2.5$	$\mu A$	
		$V_I = V_{CC}$ or GND	0 V to 5.5 V		$\pm 0.1$		$\pm 1^*$	$\pm 1$		
$I_{CC}$	Quiescent	$V_I = V_{CC}$ or GND, $I_O = 0$			4		40	40	$\mu A$	
$I_{CC}$	Active state (per circuit)	$V_I = V_{CC}$ or GND, $R_{ext}/C_{ext} = 0.5 V_{CC}$		560	750		975	975	$\mu A$	
$\Delta I_{CC}^{\ddagger}$		One input at 3.4 V, Other inputs at $V_{CC}$ or GND			1.35		1.5	1.5	mA	
$C_i$		$V_I = V_{CC}$ or GND		1.9	10			10	pF	

\* On products compliant to MIL-PRF-38535, this parameter is not production tested at  $V_{CC} = 0 \text{ V}$ .

$\dagger$  This test is performed with the terminal in the off-state condition.

$\ddagger$  This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or  $V_{CC}$ .

## timing requirements over recommended operating free-air temperature range, $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$ (unless otherwise noted) (see Figure 1)

	TEST CONDITIONS	$T_A = 25^{\circ}C$			SN54AHCT123A		SN74AHCT123A		UNIT
		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_w$	Pulse duration CLR A or B trigger		5			5		5	ns
			5			5		5	
$t_{rr}$	Pulse retrigger time	$R_{ext} = 1 \text{ k}\Omega, C_{ext} = 100 \text{ pF}$	§	60		§		§	ns
		$R_{ext} = 1 \text{ k}\Omega, C_{ext} = 0.01 \mu\text{F}$	§	1.5		§		§	$\mu\text{s}$

§ See retriggering data in the *application information* section.



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**switching characteristics over recommended operating free-air temperature range,  
V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	T <sub>A</sub> = 25°C			SN54AHCT123A		SN74AHCT123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A̅ or B	Q or Q̅	C <sub>L</sub> = 15 pF	5.3*	10*	1*	13*	1	11	ns	
t <sub>PHL</sub>				5.3*	10*	1*	13*	1	11		
t <sub>PLH</sub>	CLR̅	Q or Q̅	C <sub>L</sub> = 15 pF	7.7*	12*	1*	15*	1	13	ns	
t <sub>PHL</sub>				7.7*	12*	1*	15*	1	13		
t <sub>PLH</sub>	CLR̅ trigger	Q or Q̅	C <sub>L</sub> = 15 pF	8*	13*	1*	16*	1	14	ns	
t <sub>PHL</sub>				8*	13*	1*	16*	1	14		
t <sub>PLH</sub>	A̅ or B	Q or Q̅	C <sub>L</sub> = 50 pF	6.8	11	1	14	1	12	ns	
t <sub>PHL</sub>				6.8	11	1	14	1	12		
t <sub>PLH</sub>	CLR̅	Q or Q̅	C <sub>L</sub> = 50 pF	9.2	13	1	16	1	14	ns	
t <sub>PHL</sub>				9.2	13	1	16	1	14		
t <sub>PLH</sub>	CLR̅ trigger	Q or Q̅	C <sub>L</sub> = 50 pF	9.5	14	1	17	1	15	ns	
t <sub>PHL</sub>				9.5	14	1	17	1	15		
t <sub>w</sub> †		Q or Q̅	C <sub>L</sub> = 50 pF, C <sub>ext</sub> = 28 pF, R <sub>ext</sub> = 2 kΩ	133	200		240		240	ns	
			C <sub>L</sub> = 50 pF, C <sub>ext</sub> = 0.01 μF, R <sub>ext</sub> = 10 kΩ	90	100	110	90	110	90	110	μs
			C <sub>L</sub> = 50 pF, C <sub>ext</sub> = 0.1 μF, R <sub>ext</sub> = 10 kΩ	0.9	1	1.1	0.9	1.1	0.9	1.1	ms
Δt <sub>w</sub> ‡				±1						%	

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

† t<sub>w</sub> = Pulse duration at Q and Q̅ outputs

‡ Δt<sub>w</sub> = Output pulse-duration variation (Q and Q̅) between circuits in same package

## operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

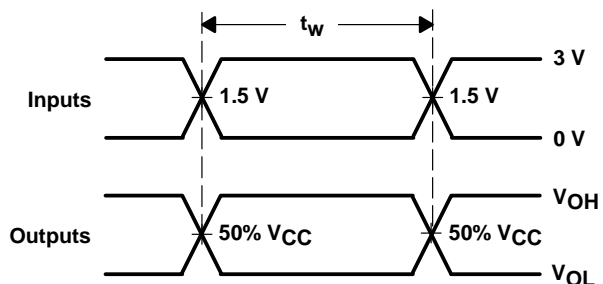
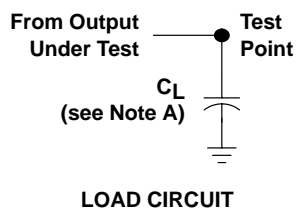
PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	No load	29	pF



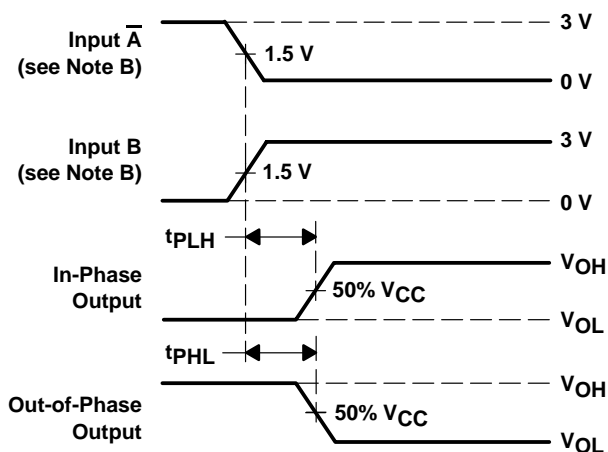
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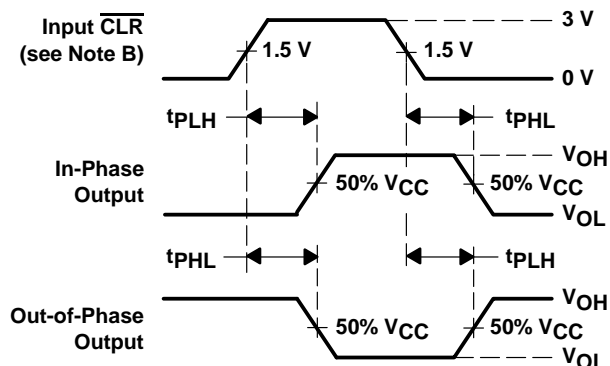
## PARAMETER MEASUREMENT INFORMATION



VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
DELAY TIMES



VOLTAGE WAVEFORMS  
DELAY TIMES

- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All input pulses are supplied by generators having the following characteristics:  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .  
 C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

## APPLICATION INFORMATION

### caution in use

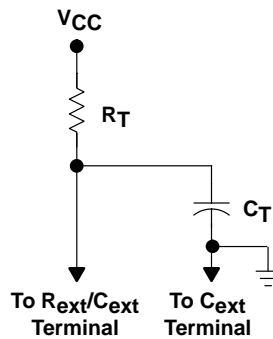
To prevent malfunctions due to noise, connect a high-frequency capacitor between  $V_{CC}$  and GND, and keep the wiring between the external components and  $C_{ext}$  and  $R_{ext}/C_{ext}$  terminals as short as possible.

### power-down considerations

Large values of  $C_{ext}$  may cause problems when powering down the 'AHCT123A devices because of the amount of energy stored in the capacitor. When a system containing this device is powered down, the capacitor may discharge from  $V_{CC}$  through the protection diodes at pin 2 or pin 14. Current through the input protection diodes must be limited to 30 mA; therefore, the turn-off time of the  $V_{CC}$  power supply must not be faster than  $t = V_{CC} \times C_{ext} / 30 \text{ mA}$ . For example, if  $V_{CC} = 5 \text{ V}$  and  $C_{ext} = 15 \text{ pF}$ , the  $V_{CC}$  supply must turn off no faster than  $t = (5 \text{ V}) \times (15 \text{ pF}) / 30 \text{ mA} = 2.5 \text{ ns}$ . Usually, this is not a problem because power supplies are heavily filtered and cannot discharge at this rate. When a more rapid decrease of  $V_{CC}$  to zero occurs, the 'AHCT123A devices may sustain damage. To avoid this possibility, use external clamping diodes.

### output pulse duration

The output pulse duration,  $t_w$ , is determined primarily by the values of the external capacitance ( $C_T$ ) and timing resistance ( $R_T$ ). The timing components are connected as shown in Figure 2.



**Figure 2. Timing-Component Connections**

The pulse duration is given by:

$$t_w = K \times R_T \times C_T \tag{1}$$

if  $C_T$  is  $\geq 1000 \text{ pF}$ ,  $K = 1.0$  or  
 if  $C_T$  is  $< 1000 \text{ pF}$ ,  $K$  can be determined from Figure 5

where:

- $t_w$  = pulse duration in ns
- $R_T$  = external timing resistance in  $k\Omega$
- $C_T$  = external capacitance in pF
- $K$  = multiplier factor

Equation 1 and Figure 3 can be used to determine values for pulse duration, external resistance, and external capacitance.

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## APPLICATION INFORMATION

### retriggering data

The minimum input retriggering time ( $t_{MIR}$ ) is the minimum time required after the initial signal before retriggering the input. After  $t_{MIR}$ , the device retriggers the output. Experimentally, it also can be shown that to retrigger the output pulse, the two adjacent input signals should be  $t_{MIR}$  apart, where  $t_{MIR} = 0.30 \times t_w$ . The retrigger pulse duration is calculated as shown in Figure 3.

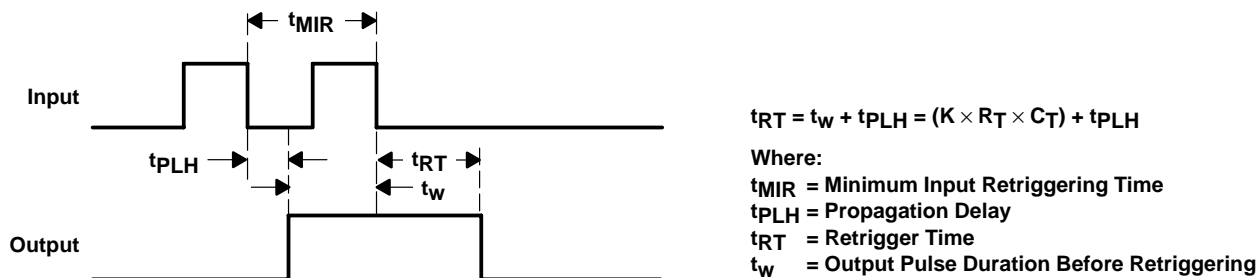
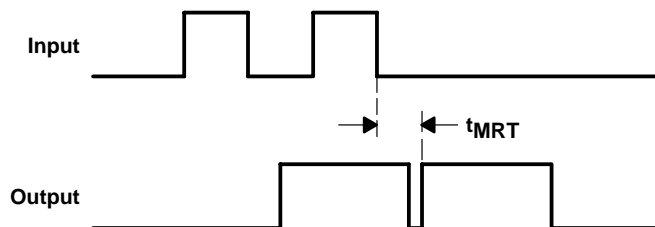


Figure 3. Retrigger Pulse Duration

The minimum value from the end of the input pulse to the beginning of the retriggered output should be approximately 15 ns to ensure a retriggered output (see Figure 4).



$t_{MRT}$  = Minimum Time Between the End of the Second Input Pulse and the Beginning of the Retriggered Output  
 $t_{MRT} = 15 \text{ ns}$

Figure 4. Input/Output Requirements



APPLICATION INFORMATION†

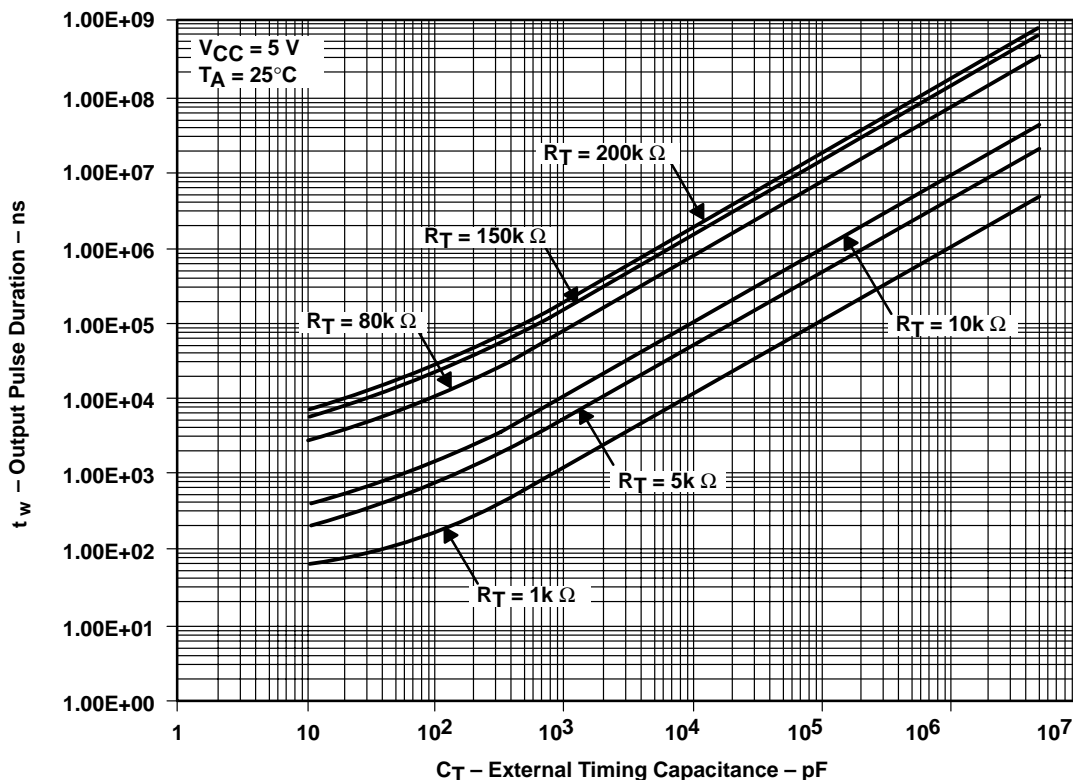


Figure 5. Output Pulse Duration vs External Timing Capacitance

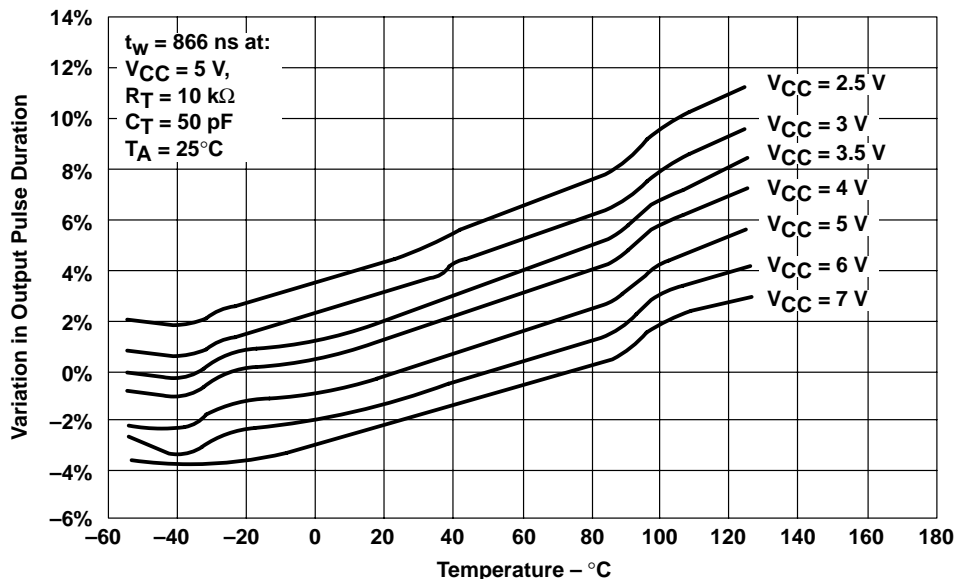


Figure 6. Variations in Output Pulse Duration vs Temperature

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.

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## APPLICATION INFORMATION†

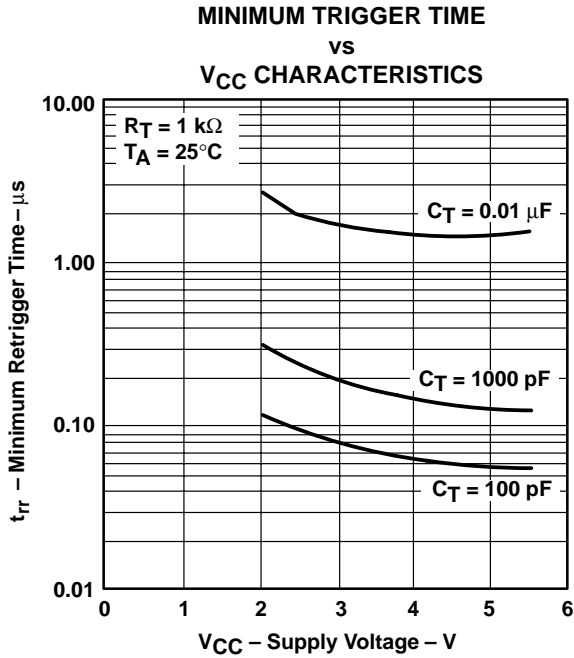


Figure 7

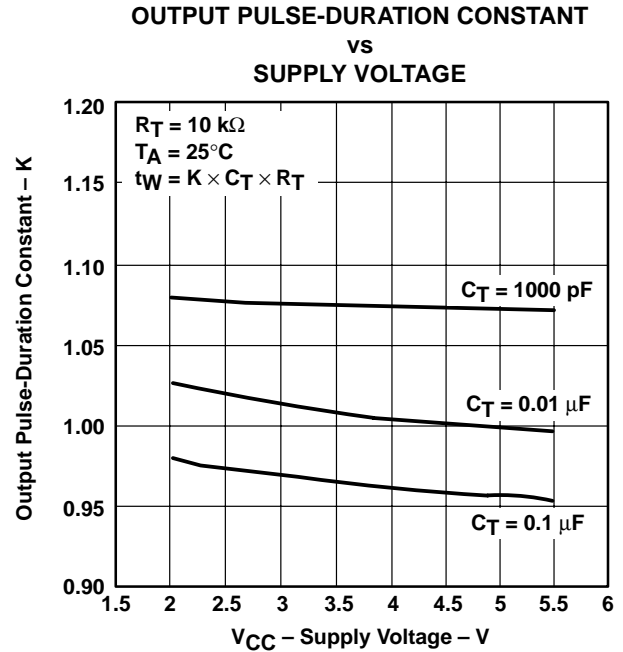


Figure 8

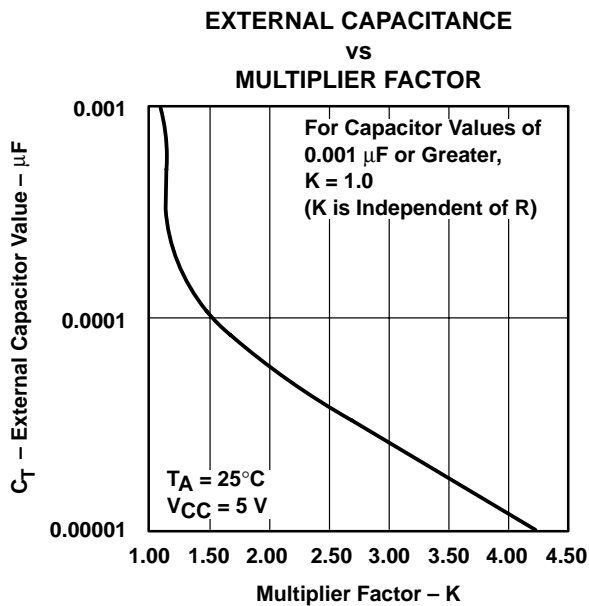


Figure 9

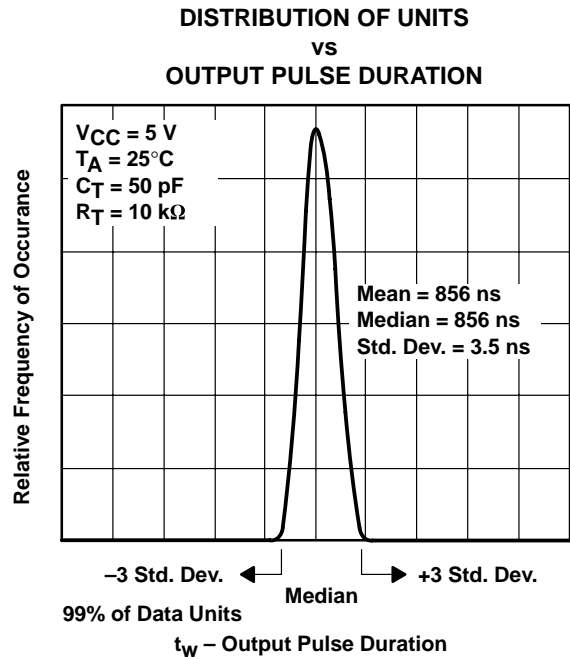


Figure 10

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.



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**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9861601Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9861601Q2A SNJ54AHCT 123AFK	<a href="#">Samples</a>
5962-9861601QEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9861601QE A SNJ54AHCT123AJ	<a href="#">Samples</a>
5962-9861601QFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9861601QF A SNJ54AHCT123AW	<a href="#">Samples</a>
SN74AHCT123AD	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT123A	<a href="#">Samples</a>
SN74AHCT123ADBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB123A	<a href="#">Samples</a>
SN74AHCT123ADGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB123A	<a href="#">Samples</a>
SN74AHCT123ADR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT123A	<a href="#">Samples</a>
SN74AHCT123AN	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT123AN	<a href="#">Samples</a>
SN74AHCT123ANE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT123AN	<a href="#">Samples</a>
SN74AHCT123APWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB123A	<a href="#">Samples</a>
SN74AHCT123APWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB123A	<a href="#">Samples</a>
SNJ54AHCT123AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9861601Q2A SNJ54AHCT 123AFK	<a href="#">Samples</a>
SNJ54AHCT123AJ	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9861601QE A SNJ54AHCT123AJ	<a href="#">Samples</a>
SNJ54AHCT123AW	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9861601QF A	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
										SNJ54AHCT123AW	

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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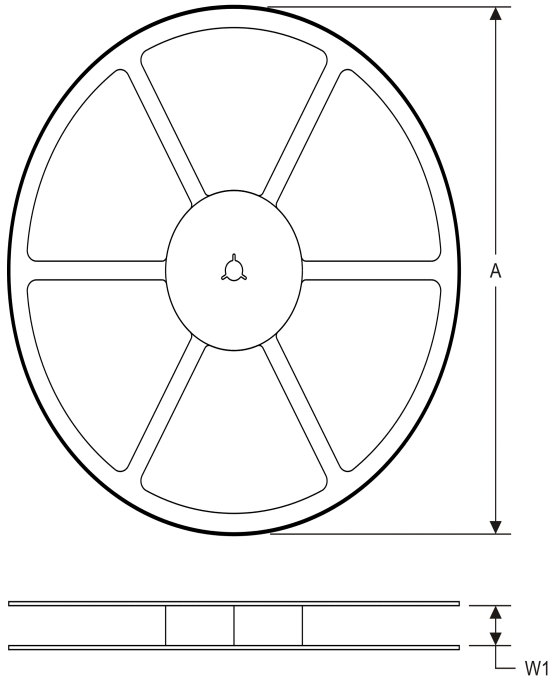
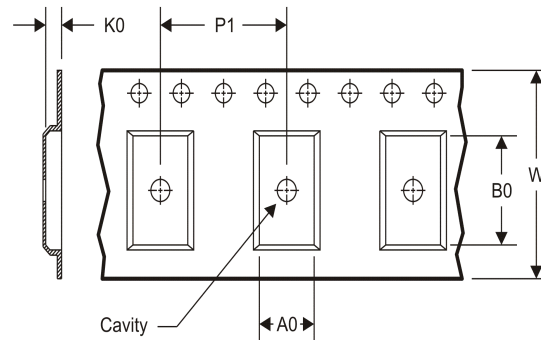
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54AHCT123A, SN74AHCT123A :**

- Catalog: [SN74AHCT123A](#)
- Military: [SN54AHCT123A](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**TAPE AND REEL INFORMATION**

\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT123ADBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHCT123ADGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHCT123ADR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHCT123APWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT123ADBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74AHCT123ADGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74AHCT123ADR	SOIC	D	16	2500	333.2	345.9	28.6
SN74AHCT123APWR	TSSOP	PW	16	2000	367.0	367.0	35.0

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004



D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

DGV (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

24 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.  
 D. Falls within JEDEC: 24/48 Pins – MO-153  
 14/16/20/56 Pins – MO-194

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP2-F16

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040064-4/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4211284-3/G 08/15

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

DB (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-150



N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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