SN54AHC123A, SN74AHC123A
DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATORS
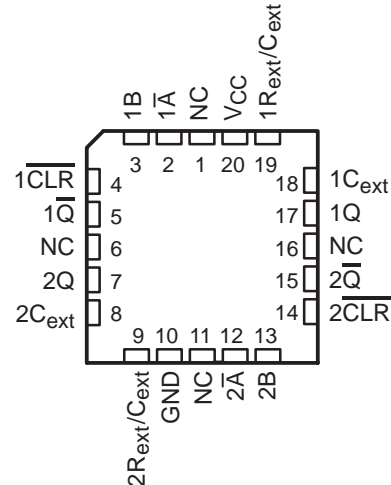
- **Operating Range 2-V to 5.5-V V_{CC}**
- **Schmitt-Trigger Circuitry On $\overline{A}$, B, and $\overline{CLR}$ Inputs for Slow Input Transition Rates**
- **Edge Triggered From Active-High or Active-Low Gated Logic Inputs**
- **Retriggerable for Very Long Output Pulses**
- **Overriding Clear Terminates Output Pulse**
- **Glitch-Free Power-Up Reset On Outputs**
- **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

The 'AHC123A devices are dual retriggerable monostable multivibrators designed for 2-V to 5.5-V V_{CC} operation.

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.

SN54AHC123A . . . J OR W PACKAGE
SN74AHC123A . . . D, DB, DGV, N, OR PW PACKAGE
(TOP VIEW)

$1\overline{A}$	1	16	V_{CC}
1B	2	15	$1R_{ext}/C_{ext}$
$1\overline{CLR}$	3	14	$1C_{ext}$
$1\overline{Q}$	4	13	1Q
2Q	5	12	$2\overline{Q}$
$2C_{ext}$	6	11	$2\overline{CLR}$
$2R_{ext}/C_{ext}$	7	10	2B
GND	8	9	$2\overline{A}$
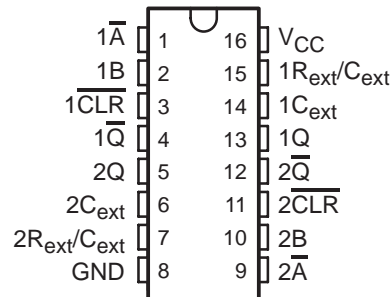
SN54AHC123A . . . FK PACKAGE
(TOP VIEW)

Top pins: 1B, $1\overline{A}$, NC, V_{CC}, $1R_{ext}/C_{ext}$ (pins 3, 2, 1, 20, 19)

$1\overline{CLR}$ 4		18 $1C_{ext}$
$1\overline{Q}$ 5		17 1Q
NC 6		16 NC
2Q 7		15 $2\overline{Q}$
$2C_{ext}$ 8		14 $2\overline{CLR}$

Bottom pins (9, 10, 11, 12, 13): $2R_{ext}/C_{ext}$, GND, NC, $2\overline{A}$, 2B

NC – No internal connection

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	PDIP – N	Tube	SN74AHC123AN	SN74AHC123AN
	SOIC – D	Tube	SN74AHC123AD	AHC123A
		Tape and reel	SN74AHC123ADR	
	SSOP – DB	Tape and reel	SN74AHC123ADBR	HA123A
	TSSOP – PW	Tape and reel	SN74AHC123APWR	HA123A
	TVSOP – DGV	Tape and reel	SN74AHC123ADGVR	HA123A
−55°C to 125°C	CDIP – J	Tube	SNJ54AHC123AJ	SNJ54AHC123AJ
	CFP – W	Tube	SNJ54AHC123AW	SNJ54AHC123AW
	LCCC – FK	Tube	SNJ54AHC123AFK	SNJ54AHC123AFK

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

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TEXAS INSTRUMENTS

description/ordering information (continued)

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.

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. 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 ±0.5% for given external timing components. An example of this distribution for the 'AHC123A 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	
$\overline{CLR}$	$\overline{A}$	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L[†]	H[†]
X	X	L	L[†]	H[†]
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)
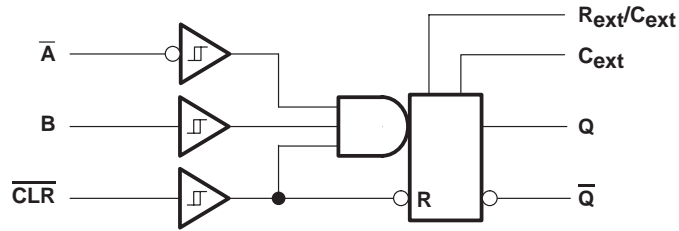
input/output timing diagram

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
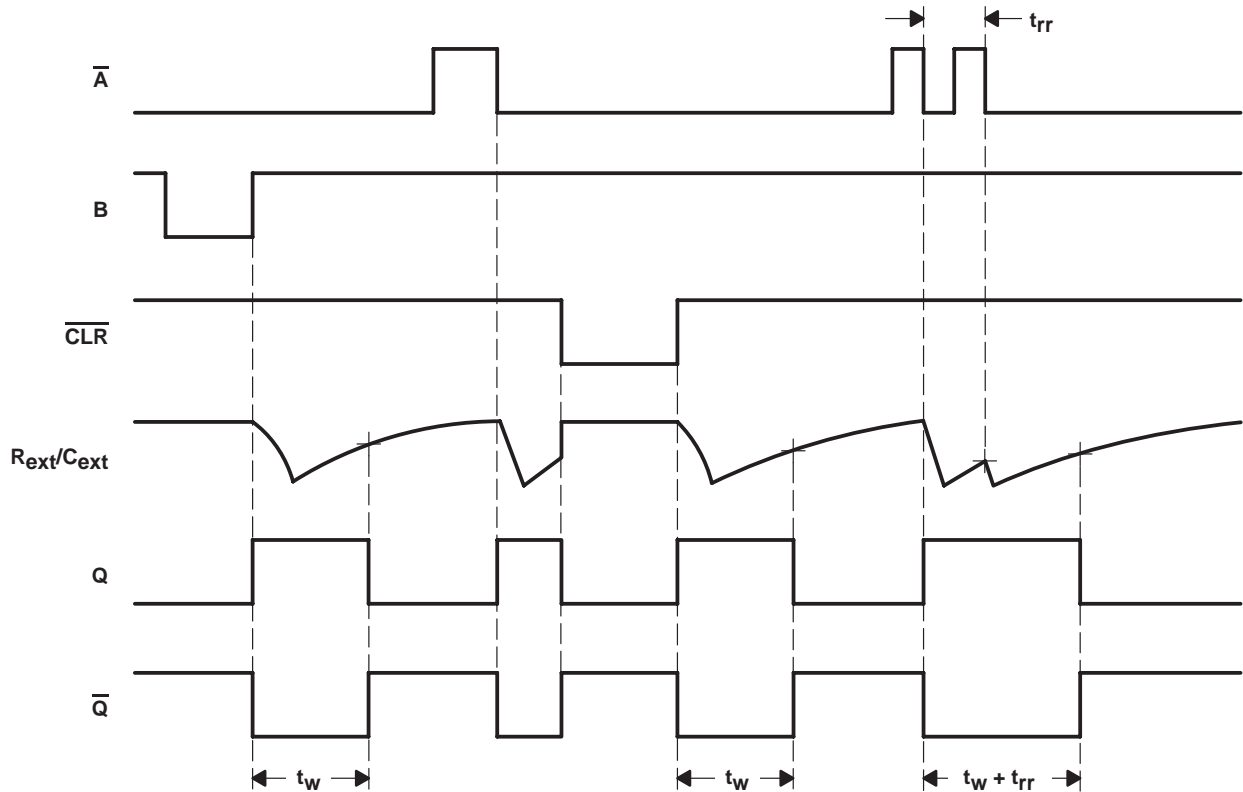
Output voltage range in high or low state, V_O (see Note 1) . . . . −0.5 V to V_{CC} + 0.5 V

Output voltage range in power-off state, V_O (see Note 1) . . . . −0.5 V to 7 V

Input clamp current, I_{IK} (V_I < 0) . . . . −20 mA

Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) . . . . ±20 mA

Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . ±25 mA

Continuous current through V_{CC} or GND . . . . ±50 mA

Package thermal impedance, θ_{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.

recommended operating conditions (see Note 4)

			SN54AHC123A		SN74AHC123A		UNIT
			MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage		2	5.5	2	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5		1.5		V
		V_{CC} = 3 V	2.1		2.1		
		V_{CC} = 5.5 V	3.85		3.85		
V_{IL}	Low-level input voltage	V_{CC} = 2 V		0.5		0.5	V
		V_{CC} = 3 V		0.9		0.9	
		V_{CC} = 5.5 V		1.65		1.65	
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	V_{CC} = 2 V		−50		−50	µA
		V_{CC} = 3.3 V ± 0.3 V		−4		−4	mA
		V_{CC} = 5 V ± 0.5 V		−8		−8	
I_{OL}	Low-level output current	V_{CC} = 2 V		50		50	µA
		V_{CC} = 3.3 V ± 0.3 V		4		4	mA
		V_{CC} = 5 V ± 0.5 V		8		8	
R_{ext}	External timing resistance	V_{CC} = 2 V	5k		5k		Ω
		V_{CC} > 3 V	1k		1k		
$\Delta t / \Delta V_{CC}$	Power-up ramp rate		1		1		ms/V
T_A	Operating free-air temperature		−55	125	−40	85	°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}	$T_A = 25°C$			SN54AHC123A		SN74AHC123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}		$I_{OH} = -50\ \mu A$	2 V	1.9	2		1.9		1.9		V
			3 V	2.9	3		2.9		2.9		
			4.5 V	4.4	4.5		4.4		4.4		
		$I_{OH} = -4\ mA$	3 V	2.58			2.48		2.48		
		$I_{OH} = -8\ mA$	4.5 V	3.94			3.8		3.8		
V_{OL}		$I_{OL} = 50\ \mu A$	2 V			0.1		0.1		0.1	V
			3 V			0.1		0.1		0.1	
			4.5 V			0.1		0.1		0.1	
		$I_{OL} = 4\ mA$	3 V			0.36		0.5		0.44	
		$I_{OL} = 8\ mA$	4.5 V			0.36		0.5		0.44	
I_I	R_{ext}/C_{ext}†	$V_I = V_{CC}$ or GND	5.5 V			±0.25		±2.5		±2.5	μA
	$\overline{A}$, B, and $\overline{CLR}$	$V_I = V_{CC}$ or GND	0 V to 5.5 V			±0.1		±1*		±1	
I_{CC}	Quiescent	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40		40	μA
I_{CC}	Active state (per circuit)	$V_I = V_{CC}$ or GND, $R_{ext}/C_{ext} = 0.5\ V_{CC}$	3 V		160	250		280		280	μA
			4.5 V		280	500		650		650	
			5.5 V		360	750		975		975	
C_i		$V_I = V_{CC}$ or GND	5 V		1.9	10				10	pF

* On products compliant to MIL-PRF-38535, this parameter is not production tested at $V_{CC} = 0$ V.
† This test is performed with the terminal in the off-state condition.

timing requirements over recommended operating free-air temperature range, $V_{CC} = 3.3\ V \pm 0.3\ V$ (unless otherwise noted) (see Figure 1)

			TEST CONDITIONS	$T_A = 25°C$			SN54AHC123A		SN74AHC123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	$\overline{CLR}$		5			5		5		ns
		$\overline{A}$ or B trigger		5			5		5		
t_{rr}	Pulse retrigger time	$R_{ext} = 1\ k\Omega$, $C_{ext} = 100\ pF$	‡	76		‡		‡		ns
		$R_{ext} = 1\ k\Omega$, $C_{ext} = 0.01\ \mu F$	‡	1.8		‡		‡		μs

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

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

			TEST CONDITIONS	$T_A = 25°C$			SN54AHC123A		SN74AHC123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	$\overline{CLR}$		5			5		5		ns
		$\overline{A}$ or B trigger		5			5		5		
t_{rr}	Pulse retrigger time	$R_{ext} = 1\ k\Omega$, $C_{ext} = 100\ pF$	‡	59		‡		‡		ns
		$R_{ext} = 1\ k\Omega$, $C_{ext} = 0.01\ \mu F$	‡	1.5		‡		‡		μs

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

TEXAS
INSTRUMENTS

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switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	T_A = 25°C			SN54AHC123A		SN74AHC123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	$\overline{A}$ or B	Q or $\overline{Q}$	C_L = 15 pF		9.5*	20.6*	1*	24*	1	24	ns
t_{PHL}					10.2*	20.6*	1*	24*	1	24	
t_{PLH}	$\overline{CLR}$	Q or $\overline{Q}$	C_L = 15 pF		7.5*	15.8*	1*	18.5*	1	18.5	ns
t_{PHL}					9.3*	15.8*	1*	18.5*	1	18.5	
t_{PLH}	$\overline{CLR}$ trigger	Q or $\overline{Q}$	C_L = 15 pF		10*	22.4*	1*	26*	1	26	ns
t_{PHL}					10.6*	22.4*	1*	26*	1	26	
t_{PLH}	$\overline{A}$ or B	Q or $\overline{Q}$	C_L = 50 pF		10.5	24.1	1	27.5	1	27.5	ns
t_{PHL}					11.8	24.1	1	27.5	1	27.5	
t_{PLH}	$\overline{CLR}$	Q or $\overline{Q}$	C_L = 50 pF		8.9	19.3	1	22	1	22	ns
t_{PHL}					10.5	19.3	1	22	1	22	
t_{PLH}	$\overline{CLR}$ trigger	Q or $\overline{Q}$	C_L = 50 pF		11	25.9	1	29.5	1	29.5	ns
t_{PHL}					12.3	25.9	1	29.5	1	29.5	
t_W†		Q or $\overline{Q}$	C_L = 50 pF, C_{ext} = 28 pF, R_{ext} = 2 kΩ		182	240		300		300	ns
			C_L = 50 pF, C_{ext} = 0.01 μF, R_{ext} = 10 kΩ	90	100	110	90	110	90	110	μs
			C_L = 50 pF, C_{ext} = 0.1 μF, R_{ext} = 10 kΩ	0.9	1	1.1	0.9	1.1	0.9	1.1	ms
Δt_W‡					±1						%

* On products compliant to MIL-PRF-38535, this parameter is not production tested.
† t_W = Pulse duration at Q and $\overline{Q}$ outputs
‡ Δt_W = Output pulse-duration variation (Q and $\overline{Q}$) between circuits in same package

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

PARAMETER	FROM (NPUT)	TO (OUTPUT)	TEST CONDITIONS	T_A = 25°C			SN54AHC123A		SN74AHC123A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	$\overline{A}$ or B	Q or $\overline{Q}$	C_L = 15 pF		6.5*	12*	1*	14*	1	14	ns
t_{PHL}					7.1*	12*	1*	14*	1	14	
t_{PLH}	$\overline{CLR}$	Q or $\overline{Q}$	C_L = 15 pF		5.3*	9.4*	1*	11*	1	11	ns
t_{PHL}					6.5*	9.4*	1*	11*	1	11	
t_{PLH}	$\overline{CLR}$ trigger	Q or $\overline{Q}$	C_L = 15 pF		6.9*	12.9*	1*	15*	1	15	ns
t_{PHL}					7.4*	12.9*	1*	15*	1	15	
t_{PLH}	$\overline{A}$ or B	Q or $\overline{Q}$	C_L = 50 pF		7.3	14	1	16	1	16	ns
t_{PHL}					8.3	14	1	16	1	16	
t_{PLH}	$\overline{CLR}$	Q or $\overline{Q}$	C_L = 50 pF		6.3	11.4	1	13	1	13	ns
t_{PHL}					7.4	11.4	1	13	1	13	
t_{PLH}	$\overline{CLR}$ trigger	Q or $\overline{Q}$	C_L = 50 pF		7.6	14.9	1	17	1	17	ns
t_{PHL}					8.7	14.9	1	17	1	17	
t_W†		Q or $\overline{Q}$	C_L = 50 pF, C_{ext} = 28 pF, R_{ext} = 2 kΩ		167	200		240		240	ns
			C_L = 50 pF, C_{ext} = 0.01 µF, R_{ext} = 10 kΩ	90	100	110	90	110	90	110	µs
			C_L = 50 pF, C_{ext} = 0.1 µF, R_{ext} = 10 kΩ	0.9	1	1.1	0.9	1.1	0.9	1.1	ms
Δt_W‡					±1						%

* On products compliant to MIL-PRF-38535, this parameter is not production tested.
† t_W = Pulse duration at Q and $\overline{Q}$ outputs
‡ Δt_W = Output pulse-duration variation (Q and $\overline{Q}$) between circuits in same package

operating characteristics, V_{CC} = 5 V, T_A = 25°C

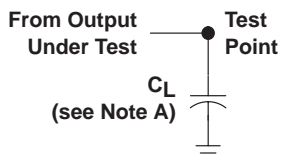| PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load	29	pF

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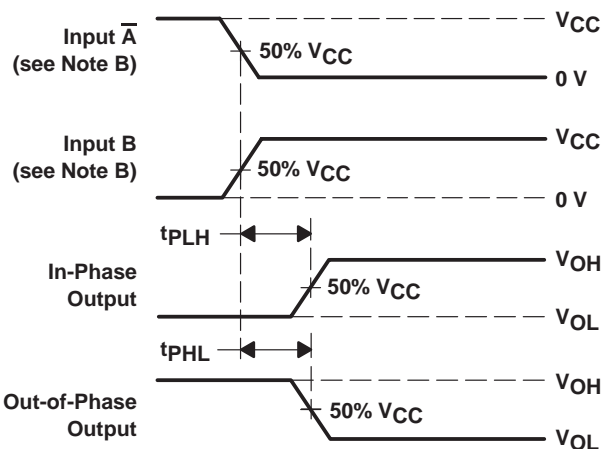POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION

LOAD CIRCUIT
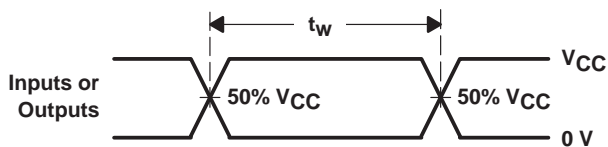
**VOLTAGE WAVEFORMS
PULSE DURATION**

**VOLTAGE WAVEFORMS
DELAY TIMES**
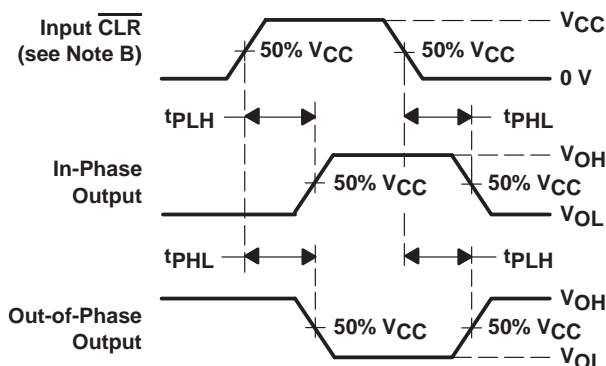
**VOLTAGE WAVEFORMS
DELAY TIMES**

NOTES: A. C_L includes probe and jig capacitance.
        B. All input pulses are supplied by generators having the following characteristics: $Z_O = 50\ \Omega$, $t_r = 3$ ns, $t_f = 3$ 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} can cause problems when powering down the 'AHC123A devices because of the amount of energy stored in the capacitor. When a system containing this device is powered down, the capacitor can 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 $t = V_{CC} \times C_{ext}/30$ mA. For example, if $V_{CC} = 5$ V and $C_{ext} = 15$ pF, the V_{CC} supply must turn off no faster than $t = (5\ V) \times (15\ pF)/30$ mA = 2.5 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 'AHC123A devices can 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.
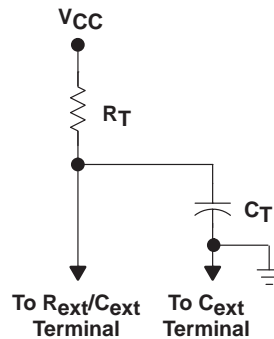
Figure 2. Timing-Component Connections

The pulse duration is given by:

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

      if C_T is ≥1000 pF, K = 1.0 or
      if C_T is <1000 pF, K can be determined from Figure 9

where:
      t_w = pulse duration in ns
      R_T = external timing resistance in kΩ
      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.

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.

$$t_{RT} = t_W + t_{PLH} = (K \times R_T \times C_T) + t_{PLH}$$

Where:
t_{MIR} = Minimum Input Retriggering Time
t_{PLH} = Propagation Delay
t_{RT} = Retrigger Time
t_W = Output Pulse Duration Before Retriggering
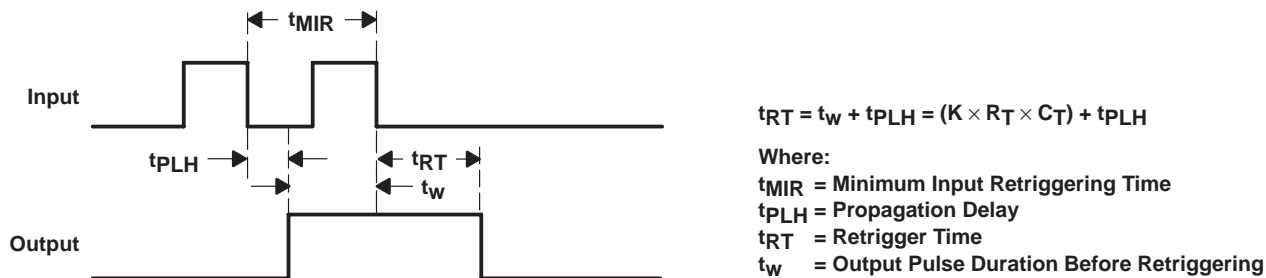
Figure 3. Retrigger Pulse Duration

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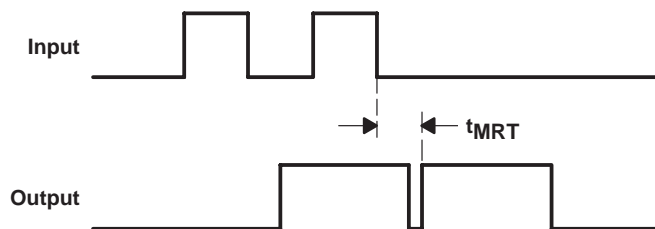
t_{MRT} = Minimum Time Between the End of the Second Input Pulse and the Beginning of the Retriggered Output
t_{MRT} = 15 ns

Figure 4. Input/Output Requirements

APPLICATION INFORMATION†
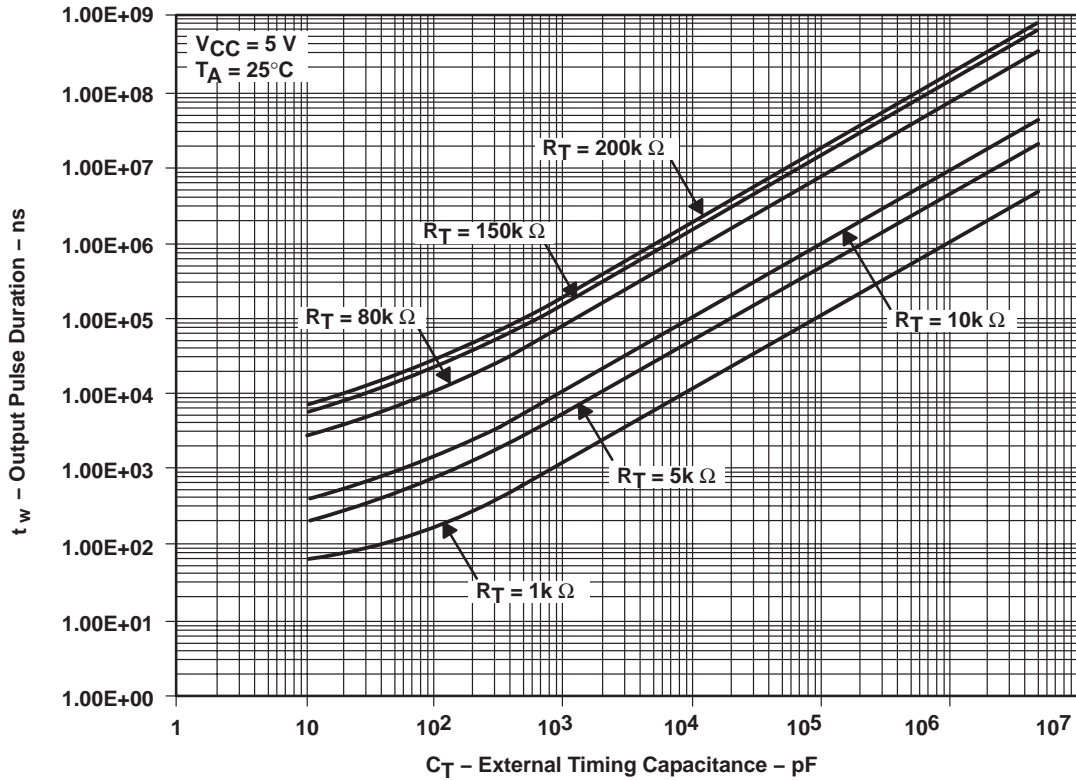
Figure 5. Output Pulse Duration vs External Timing Capacitance
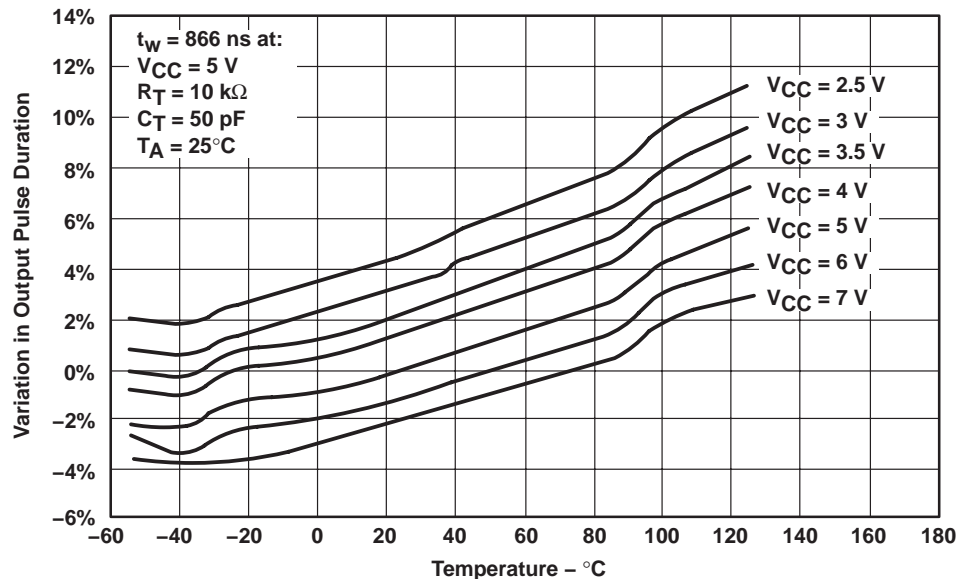
Figure 6. Variations in Output Pulse Duration vs Temperature

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

APPLICATION INFORMATION†

MINIMUM TRIGGER TIME
vs
V_{CC} CHARACTERISTICS

R_T = 1 kΩ
T_A = 25°C

C_T = 0.01 μF

C_T = 1000 pF

C_T = 100 pF

t_{rr} – Minimum Retrigger Time – μs

V_{CC} – Supply Voltage – V

Figure 7

OUTPUT PULSE-DURATION CONSTANT
vs
SUPPLY VOLTAGE

R_T = 10 kΩ
T_A = 25°C
$t_W = K \times C_T \times R_T$

C_T = 1000 pF

C_T = 0.01 μF

C_T = 0.1 μF

Output Pulse-Duration Constant – K

V_{CC} – Supply Voltage – V

Figure 8

EXTERNAL CAPACITANCE
vs
MULTIPLIER FACTOR

For Capacitor Values of
0.001 μF or Greater,
K = 1.0
(K is Independent of R)

T_A = 25°C
V_{CC} = 5 V

C_T – External Capacitor Value – μF

Multiplier Factor – K

Figure 9

DISTRIBUTION OF UNITS
vs
OUTPUT PULSE DURATION

V_{CC} = 5 V
T_A = 25°C
C_T = 50 pF
R_T = 10 kΩ

Mean = 856 ns
Median = 856 ns
Std. Dev. = 3.5 ns

Relative Frequency of Occurance

–3 Std. Dev.   +3 Std. Dev.
Median
99% of Data Units

t_W – Output Pulse Duration

Figure 10

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

TEXAS INSTRUMENTS

POST OFFICE BOX 655303 ● DALLAS, TEXAS 75265

PACKAGING INFORMATION

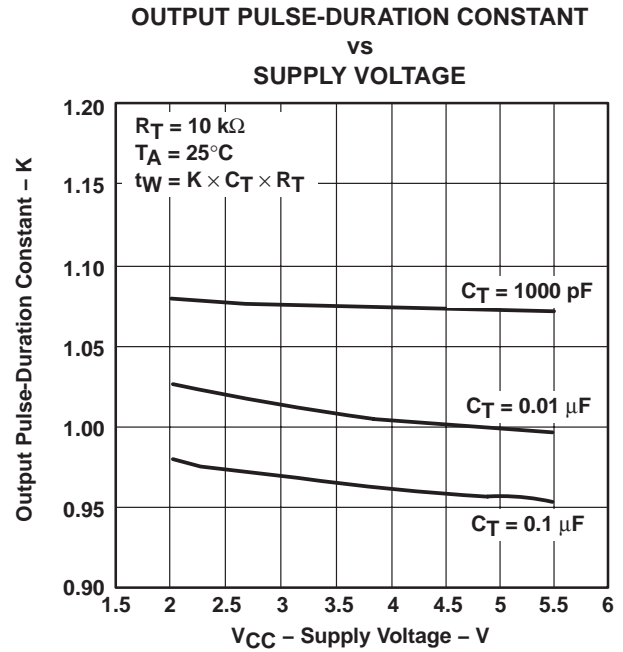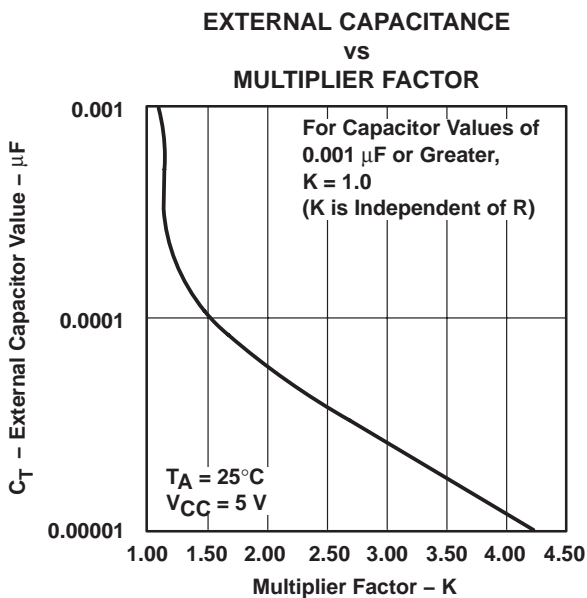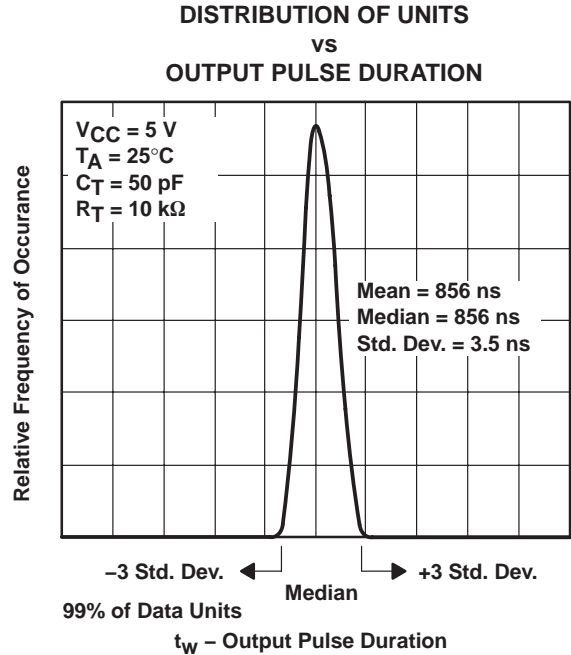| Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/ Ball Finish	MSL Peak Temp [3]	Samples (Requires Login)
5962-9860801Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
5962-9860801QEA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	
5962-9860801QFA	ACTIVE	CFP	W	16	1	TBD	Call TI	Call TI	
SN74AHC123AD	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADBRE4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADBRG4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADGVRE4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADGVRG4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123ADRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123AN	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74AHC123ANE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74AHC123APWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74AHC123APWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/ Ball Finish	MSL Peak Temp [3]	Samples (Requires Login)
SN74AHC123APWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SNJ54AHC123AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54AHC123AJ	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SNJ54AHC123AW	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	

[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.

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OTHER QUALIFIED VERSIONS OF SN54AHC123A, SN74AHC123A :

● Catalog: SN74AHC123A

● Enhanced Product: SN74AHC123A-EP

● Military: SN54AHC123A

NOTE: Qualified Version Definitions:

    ● Catalog - TI's standard catalog product

    ● Enhanced Product - Supports Defense, Aerospace and Medical Applications

    ● 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
SN74AHC123ADBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHC123ADGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHC123ADR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHC123APWR	TSSOP	PW	16	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74AHC123APWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHC123APWRG4	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)
SN74AHC123ADBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74AHC123ADGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74AHC123ADR	SOIC	D	16	2500	333.2	345.9	28.6
SN74AHC123APWR	TSSOP	PW	16	2000	364.0	364.0	27.0
SN74AHC123APWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74AHC123APWRG4	TSSOP	PW	16	2000	367.0	367.0	35.0

J (R−GDIP−T∗∗) CERAMIC DUAL IN−LINE PACKAGE
14 LEADS SHOWN

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)

B

14   8

1   7

$\dfrac{0.065\ (1,65)}{0.045\ (1,14)}$

C

0.005 (0,13) MIN

$\dfrac{0.060\ (1,52)}{0.015\ (0,38)}$

A

0.200 (5,08) MAX

Seating Plane

0.130 (3,30) MIN

$\dfrac{0.026\ (0,66)}{0.014\ (0,36)}$

0.100 (2,54)

0°−15°

$\dfrac{0.014\ (0,36)}{0.008\ (0,20)}$

4040083/F 03/03

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

W (R-GDFP-F16)   CERAMIC DUAL FLATPACK

0.285 (7,24) / 0.245 (6,22)

Base and Seating Plane

0.045 (1,14) / 0.026 (0,66)

0.080 (2,03) / 0.055 (1,40)

0.006 (0,15) / 0.004 (0,10)

0.305 (7,75) MAX

0.019 (0,48) / 0.015 (0,38)

1   16

0.430 (10,92) / 0.370 (9,40)

0.050 (1,27)

0.005 (0,13) MIN
4 Places

8   9

0.360 (9,14) / 0.250 (6,35)

0.360 (9,14) / 0.250 (6,35)

4040180-3/D 07/03

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 GDFP1-F16 and JEDEC MO-092AC

FK (S−CQCC−N**)
28 TERMINAL SHOWN

LEADLESS CERAMIC CHIP CARRIER

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: 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 metal lid.
        D. Falls within JEDEC MS−004

N (R−PDIP−T**)

PLASTIC DUAL−IN−LINE PACKAGE

16 PINS SHOWN

PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS−001 VARIATION	AA	BB	AC	AD

A

16   9

0.260 (6,60)
0.240 (6,10)

1   8

0.070 (1,78)
0.045 (1,14) D

0.045 (1,14)
0.030 (0,76) D

0.020 (0,51) MIN

0.200 (5,08) MAX

Seating Plane

0.125 (3,18) MIN

0.100 (2,54)

0.021 (0,53)
0.015 (0,38)

⊕ 0.010 (0,25) Ⓜ

14/18 Pin Only
20 Pin vendor option D

0.325 (8,26)
0.300 (7,62)

0.015 (0,38)

Gauge Plane

0.010 (0,25) NOM

0.430 (10,92) MAX

4040049/E 12/2002

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

DGV (R-PDSO-G**)　　　　　　　　　　　　　　　　　　**PLASTIC SMALL-OUTLINE**

24 PINS SHOWN

0,40

0,23
0,13

⊕ | 0,07 Ⓜ

24　　　　　　　13

0,16 NOM

4,50
4,30

6,60
6,20

Gage Plane

0°−8°

0,25

1　　　　　　　12

0,75
0,50

A

1,20 MAX

0,15
0,05

Seating Plane

⌒ | 0,08

PINS ** / DIM	14	16	20	24	38	48	56
A MAX	3,70	3,70	5,10	5,10	7,90	9,80	11,40
A MIN	3,50	3,50	4,90	4,90	7,70	9,60	11,20

4073251/E 08/00

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

TEXAS INSTRUMENTS

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D (R−PDSO−G16) PLASTIC SMALL OUTLINE

0.394 (10,00)
0.386 (9,80)

0.244 (6,20)
0.228 (5,80)

0.157 (4,00)
0.150 (3,80)

16   9

1   8

Pin 1
Index Area

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)

⊕ 0.010 (0,25) Ⓜ

0.069 (1,75) Max

0.010 (0,25)
0.004 (0,10)

0.010 (0,25)
0.005 (0,13)

Gauge Plane

0.004 (0,10)

Seating Plane

0.010 (0,25)   0°−8°

0.050 (1,27)
0.016 (0,40)

4040047−6/M   06/11

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

Example Board Layout
(Note C)

Stencil Openings
(Note D)

14x1,27

16x0,55

14x1,27

16x1,50

5,40

5.40

Example
Non Soldermask Defined Pad

Example
Pad Geometry
(See Note C)

0,60

1,55

Example
Solder Mask Opening
(See Note E)

0,07

All Around

4211283−4/E 08/12

NOTES: A. All linear dimensions are in millimeters.
           B. This drawing is subject to change without notice.
           C. Publication IPC−7351 is recommended for alternate designs.
           D. 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.
           E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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PW (R−PDSO−G16)   PLASTIC SMALL OUTLINE

0,65

0,30
0,19

⊕ | 0,10 Ⓜ

16   9

△D 4,50
    4,30

6,60
6,20

1   8

5,10
4,90

△C

0,15 NOM

Gage Plane

0°−8°

0,25

0,75
0,50

1,20 MAX

0,15
0,05

Seating Plane

⌒ | 0,10

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

TEXAS INSTRUMENTS
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PW (R−PDSO−G16)   PLASTIC SMALL OUTLINE

Example Board Layout
(Note C)

Stencil Openings
(Note D)

14x0,65

16x0,30

14x0,65

16x1,55

5,60

5,60

Example
Non Soldermask Defined Pad

Example
Pad Geometry
(See Note C)

0,35

1,60

Example
Solder Mask Opening
(See Note E)

0,07
All Around

4211284−3/E 07/12

NOTES: A. All linear dimensions are in millimeters.
          B. This drawing is subject to change without notice.
          C. Publication IPC−7351 is recommended for alternate designs.
          D. 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.
          E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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DB (R-PDSO-G**) PLASTIC SMALL-OUTLINE

28 PINS SHOWN

PINS ** DIM	14	16	20	24	28	30	38
A MAX	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	5,90	5,90	6,90	7,90	9,90	9,90	12,30

4040065 /E 12/01

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

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