

High-Speed CMOS Logic Dual Retriggerable Monostable Multivibrators with Resets

Features

- Overriding Reset Terminates Output Pulse
- Triggering From the Leading or Trailing Edge
- Q and \bar{Q} Buffered Outputs
- Separate Resets
- Wide Range of Output-Pulse Widths
- Schmitt Trigger on Both \bar{A} and B Inputs
- Fanout (Over Temperature Range)
 - Standard Outputs 10 LSTTL Loads
 - Bus Driver Outputs 15 LSTTL Loads
- Wide Operating Temperature Range . . . -55°C to 125°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- HC Types
 - 2V to 6V Operation
 - High Noise Immunity: $N_{IL} = 30\%$, $N_{IH} = 30\%$ of V_{CC} at $V_{CC} = 5V$
- HCT Types
 - 4.5V to 5.5V Operation
 - Direct LSTTL Input Logic Compatibility, $V_{IL} = 0.8V$ (Max), $V_{IH} = 2V$ (Min)
 - CMOS Input Compatibility, $I_I \leq 1\mu A$ at V_{OL} , V_{OH}

Description

The 'HC123, 'HCT123, CD74HC423 and CD74HCT423 are dual monostable multivibrators with resets. They are all retriggerable and differ only in that the 123 types can be triggered by a negative to positive reset pulse; whereas the 423 types do not have this feature. An external resistor (R_X) and an external capacitor (C_X) control the timing and the accuracy for the circuit. Adjustment of R_X and C_X provides a wide range of output pulse widths from the Q and \bar{Q} terminals. Pulse triggering on the \bar{A} and B inputs occur at a particular voltage level and is not related to the rise and fall times of the trigger pulses.

Once triggered, the output pulse width may be extended by retriggering inputs \bar{A} and B. The output pulse can be terminated by a LOW level on the Reset (R) pin. Trailing edge triggering (\bar{A}) and leading edge triggering (B) inputs are provided for triggering from either edge of the input pulse. If either Mono is not used each input on the unused device (\bar{A} , B, and R) must be terminated high or low.

The minimum value of external resistance, R_X is typically 5k Ω . The minimum value external capacitance, C_X , is 0pF. The calculation for the pulse width is $t_W = 0.45 R_X C_X$ at $V_{CC} = 5V$.

Ordering Information

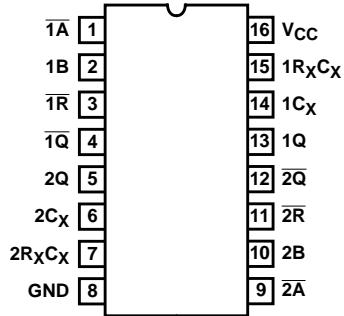
PART NUMBER	TEMP. RANGE (°C)	PACKAGE
CD54HC123F3A	-55 to 125	16 Ld CERDIP
CD54HCT123F3A	-55 to 125	16 Ld CERDIP
CD74HC123E	-55 to 125	16 Ld PDIP
CD74HC123M	-55 to 125	16 Ld SOIC
CD74HC123MT	-55 to 125	16 Ld SOIC
CD74HC123M96	-55 to 125	16 Ld SOIC
CD74HC123NSR	-55 to 125	16 Ld SOP
CD74HC123PW	-55 to 125	16 Ld TSSOP
CD74HC123PWR	-55 to 125	16 Ld TSSOP
CD74HC123PWT	-55 to 125	16 Ld TSSOP
CD74HC423E	-55 to 125	16 Ld PDIP
CD74HC423M	-55 to 125	16 Ld SOIC
CD74HC423MT	-55 to 125	16 Ld SOIC
CD74HC423M96	-55 to 125	16 Ld SOIC
CD74HC423NSR	-55 to 125	16 Ld SOP
CD74HCT123E	-55 to 125	16 Ld PDIP
CD74HCT123M	-55 to 125	16 Ld SOIC
CD74HCT123MT	-55 to 125	16 Ld SOIC
CD74HCT123M96	-55 to 125	16 Ld SOIC
CD74HCT423E	-55 to 125	16 Ld PDIP
CD74HCT423MT	-55 to 125	16 Ld SOIC
CD74HCT423M96	-55 to 125	16 Ld SOIC

NOTE: When ordering, use the entire part number. The suffixes 96 and R denote tape and reel. The suffix T denotes a small-quantity reel of 250.

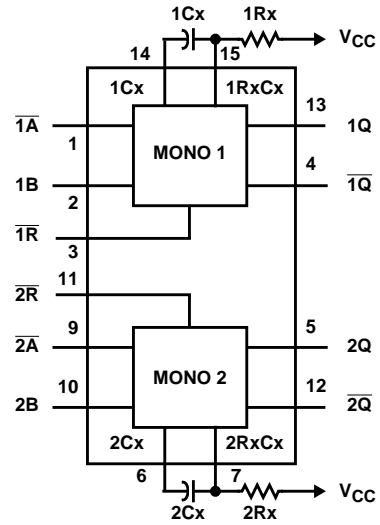
CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

Pinout

CD54HC123, CD54HCT123
(CERDIP)
CD74HC123
(PDIP, SOIC, SOP, TSSOP)
CD74HC423
(PDIP, SOIC, SOP)
CD74HCT123, CD74HCT423
(PDIP, SOIC)
TOP VIEW



Functional Diagram



TRUTH TABLE

INPUTS			OUTPUTS	
\bar{A}	B	\bar{R}	Q	\bar{Q}
CD74HC/HCT123				
H	X	H	L	H
X	L	H	L	H
L	↑	H	⌋	⌋
↓	H	H	⌋	⌋
X	X	L	L	H
L	H	↑	⌋	⌋
CD74HC/HCT423				
H	X	H	L	H
X	L	H	L	H
L	↑	H	⌋	⌋
↓	H	H	⌋	⌋
X	X	L	L	H

H = High Voltage Level, L = Low Voltage Level,
X = Don't Care.

CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

Absolute Maximum Ratings

DC Supply Voltage, V_{CC}	-0.5V to 7V
DC Input Diode Current, I_{IK}	
For $V_I < -0.5V$ or $V_I > V_{CC} + 0.5V$	$\pm 20mA$
DC Output Diode Current, I_{OK}	
For $V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$	$\pm 20mA$
DC Output Source or Sink Current per Output Pin, I_O	
For $V_O > -0.5V$ or $V_O < V_{CC} + 0.5V$	$\pm 25mA$
DC V_{CC} or Ground Current, I_{CC} or I_{GND}	$\pm 50mA$

Thermal Information

Package Thermal Impedance, θ_{JA} (see Note 1):	
E (PDIP) Package	67°C/W
M (SOIC) Package	73°C/W
NS (SOP) Package	64°C/W
PW (TSSOP) Package	108°C/W
Maximum Junction Temperature	150°C
Maximum Storage Temperature Range	-65°C to 150°C
Maximum Lead Temperature (Soldering 10s)	300°C
(SOIC - Lead Tips Only)	

Operating Conditions

Temperature Range (T_A)	-55°C to 125°C
Supply Voltage Range, V_{CC}	
HC Types2V to 6V
HCT Types	4.5V to 5.5V
DC Input or Output Voltage, V_I , V_O	0V to V_{CC}
Input Rise and Fall Time	
2V	1000ns (Max)
4.5V	500ns (Max)
6V	400ns (Max)

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

- The package thermal impedance is calculated in accordance with JESD 51-7.

DC Electrical Specifications

PARAMETER	SYMBOL	TEST CONDITIONS		V_{CC} (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
		V_I (V)	I_O (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
HC TYPES												
High Level Input Voltage	V_{IH}	-	-	2	1.5	-	-	1.5	-	1.5	-	V
				4.5	3.15	-	-	3.15	-	3.15	-	V
				6	4.2	-	-	4.2	-	4.2	-	V
Low Level Input Voltage	V_{IL}	-	-	2	-	-	0.5	-	0.5	-	0.5	V
				4.5	-	-	1.35	-	1.35	-	1.35	V
				6	-	-	1.8	-	1.8	-	1.8	V
High Level Output Voltage CMOS Loads	V_{OH}	V_{IH} or V_{IL}	-0.02	2	1.9	-	-	1.9	-	1.9	-	V
			-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
			-0.02	6	5.9	-	-	5.9	-	5.9	-	V
High Level Output Voltage TTL Loads	V_{OH}	V_{IH} or V_{IL}	-	-	-	-	-	-	-	-	-	V
			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
			-5.2	6	5.48	-	-	5.34	-	5.2	-	V
Low Level Output Voltage CMOS Loads	V_{OL}	V_{IH} or V_{IL}	0.02	2	-	-	0.1	-	0.1	-	0.1	V
			0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
			0.02	6	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads	V_{OL}	V_{IH} or V_{IL}	-	-	-	-	-	-	-	-	-	V
			4	4.5	-	-	0.26	-	0.33	-	0.4	V
			5.2	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I_I	V_{CC} or GND	-	6	-	-	± 0.1	-	± 1	-	± 1	μA
Quiescent Device Current	I_{CC}	V_{CC} or GND	0	6	-	-	8	-	80	-	160	μA

CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

DC Electrical Specifications (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS		V _{CC} (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNITS
		V _I (V)	I _O (mA)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
HCT TYPES												
High Level Input Voltage	V _{IH}	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V _{IL}	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V _{OH}	V _{IH} or V _{IL}	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V _{OL}	V _{IH} or V _{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I _I	V _{CC} and GND	0	5.5	-	-	±0.1	-	±1	-	±1	μA
Quiescent Device Current	I _{CC}	V _{CC} or GND	0	5.5	-	-	8	-	80	-	160	μA
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI _{CC} (Note 2)	V _{CC} -2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	μA

NOTE:

2. For dual-supply systems theoretical worst case (V_I = 2.4V, V_{CC} = 5.5V) specification is 1.8mA.

HCT Input Loading Table

INPUT	UNIT LOADS
All	0.35

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Table, e.g. 360μA max at 25°C.

Prerequisite for Switching Specifications

PARAMETER	SYMBOL	V _{CC} (V)	25°C			-40°C TO 85°C			-55°C TO 125°C			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
HC TYPES												
Minimum Input, Pulse Width A	t _{WL}	2	100	-	-	125	-	-	150	-	-	ns
		4.5	20	-	-	25	-	-	30	-	-	ns
		6	17	-	-	21	-	-	26	-	-	ns
B	t _{WH}	2	100	-	-	125	-	-	150	-	-	ns
		4.5	20	-	-	25	-	-	30	-	-	ns
		6	17	-	-	21	-	-	26	-	-	ns

CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

Prerequisite for Switching Specifications (Continued)

PARAMETER	SYMBOL	V _{CC} (V)	25°C			-40°C TO 85°C			-55°C TO 125°C			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
\bar{R}	t _{WL}	2	100	-	-	125	-	-	150	-	150	ns
		4.5	20	-	-	25	-	-	30	-	30	ns
		6	17	-	-	21	-	-	26	-	26	ns
\bar{A} and B Hold Time	t _H	2	50	-	-	65	-	-	75	-	75	ns
		4.5	10	-	-	13	-	-	15	-	15	ns
		6	9	-	-	11	-	-	13	-	13	ns
Reset Removal Time	t _{REM}	2	50	-	-	65	-	-	75	-	75	ns
		4.5	10	-	-	13	-	-	15	-	15	ns
		6	9	-	-	11	-	-	13	-	13	ns
Retrigger Time Number R _X = 10KΩ, C _X = 0	t _{rT}	5	-	-	-	-	-	-	-	-	-	ns
			-	50	-	-	63	-	-	76	-	ns
Output Pulse Width Q or \bar{Q} R _X = 10KΩ, C _X = 10nF	t _W	5	40	-	50	38.7	-	51.3	38.2	-	51.8	μs
HCT TYPES												
Minimum Input, Pulse Width \bar{A}	t _{WL}	5	20	-	-	25	-	-	30	-	-	ns
B	t _{WH}		20	-	-	25	-	-	30	-	-	ns
\bar{R}	t _{WL}		20	-	-	25	-	-	30	-	-	ns
\bar{A} and B Hold Time	t _H	5	10	-	-	13	-	-	15	-	-	ns
Reset Removal Time	t _{REM}	5	10	-	-	13	-	-	15	-	-	ns
Retrigger Time Number (Note 3) R _X = 10KΩ, C _X = 0	t _{rT}	5	-	50	-	-	63	-	-	76	-	ns
Output Pulse Width Q or \bar{Q} R _X = 10KΩ, C _X = 10nF	t _W	5	40	-	50	38.7	-	51.3	38.2	-	51.8	μs

NOTE:

- Time to trigger depends on the values of R_X and C_X. The output pulse width can only be extended when the time between the active-going edges of the trigger input pulses meet the minimum retrigger time requirement.

CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

Switching Specifications Input $t_r, t_f = 6\text{ns}$, $R_X = 10\text{K}\Omega$, $C_X = 0$

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNIT S
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
HC TYPES											
Trigger Propagation Delay \bar{A}, B, \bar{R} to \bar{Q}	t_{PLH}	$C_L = 50\text{pF}$	2	-	-	300	-	375	-	450	ns
			4.5	-	-	60	-	75	-	90	ns
		$C_L = 15\text{pF}$	5	-	25	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	51	-	64	-	76	ns
\bar{A}, B, \bar{R} to \bar{Q}	t_{PHL}	$C_L = 50\text{pF}$	2	-	-	320	-	400	-	480	ns
			4.5	-	-	64	-	80	-	96	ns
		$C_L = 15\text{pF}$	5	-	26	-	-	-	-	-	ns
		$C_L = 50\text{pF}$	6	-	-	54	-	68	-	82	ns
Reset Propagation Delay \bar{R} to \bar{Q} or \bar{Q}	t_{PHL}, t_{PLH}	$C_L = 50\text{pF}$	2	-	-	215	-	270	-	325	ns
			4.5	-	-	43	-	54	-	65	ns
			6	-	-	37	-	46	-	55	ns
Output Transition Time	t_{THL}, t_{TLH}	$C_L = 50\text{pF}$	2	-	-	75	-	95	-	110	ns
			4.5	-	-	15	-	19	-	22	ns
			6	-	-	13	-	16	-	19	ns
Output Pulse Width $R_X = 10\text{K}\Omega, C_X = 10\text{nF}$	-	-	5	-	45	-	-	-	-	μs	
Pulse Width Match Between Circuits In the Same Package $R_X = 10\text{K}\Omega, C_X = 10\text{pF}$	-	-	5	-	± 2	-	-	-	-	%	
Power Dissipation Capacitance (Note 4)	C_{PD}	$C_L = 15\text{pF}$	5	-	-	-	-	-	-	-	pF
Input Capacitance	C_{IN}	$C_L = 50\text{pF}$	-	10	-	10	-	10	-	10	pF
HCT TYPES											
Trigger Propagation Delay \bar{A}, B, \bar{R} to \bar{Q}	t_{PLH}	$C_L = 50\text{pF}$	4.5	-	-	60	-	75	-	90	ns
		$C_L = 15\text{pF}$	5	-	25	-	-	-	-	-	ns
\bar{A}, B, \bar{R} to \bar{Q}	t_{PHL}	$C_L = 50\text{pF}$	4.5	-	-	68	-	85	-	102	ns
		$C_L = 15\text{pF}$	5	-	27	-	-	-	-	-	ns
Reset Propagation Delay \bar{R} to \bar{Q} or \bar{Q}	t_{PHL}, t_{PLH}	$C_L = 50\text{pF}$	4.5	-	-	48	-	60	-	72	ns
Output Transition Time	t_{THL}, t_{TLH}	$C_L = 50\text{pF}$	4.5	-	-	15	-	19	-	22	ns
Output Pulse Width $R_X = 10\text{K}\Omega, C_X = 10\text{nF}$	-	-	5	-	45	-	-	-	-	-	μs

CD54/74HC123, CD54/74HCT123, CD74HC423, CD74HCT423

Switching Specifications Input $t_r, t_f = 6\text{ns}$, $R_X = 10\text{K}\Omega$, $C_X = 0$ (Continued)

PARAMETER	SYMBOL	TEST CONDITIONS	V_{CC} (V)	25°C			-40°C TO 85°C		-55°C TO 125°C		UNIT S
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
Pulse Width Match Between Circuits In the Same Package $R_X = 10\text{K}\Omega$, $C_X = 10\text{pF}$	-	-	5		± 2	-	-	-	-	-	%
Input Capacitance	C_{IN}	$C_L = 50\text{pF}$	-	-	-	10	-	10	-	10	pF

NOTE:

4. C_{PD} is used to determine the dynamic power consumption, per multivibrator.

$$P_D = (C_{PD} + C_X) V_{CC}^2 f_i \sum (C_L V_{CC}^2 f_O)$$

Where

f_i = input frequency

f_O = Output Frequency

C_L = Output Load Capacitance

C_X = External Capacitance

V_{CC} = Supply Voltage,

assuming $f_i \ll \frac{1}{t_W}$

Test Circuits and Waveforms

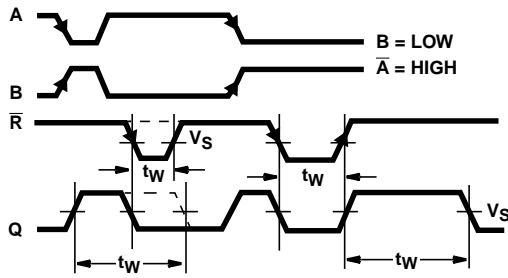


FIGURE 1. OUTPUT PULSE CONTROL USING RESET INPUT (\bar{R}) PULSE FOR 123

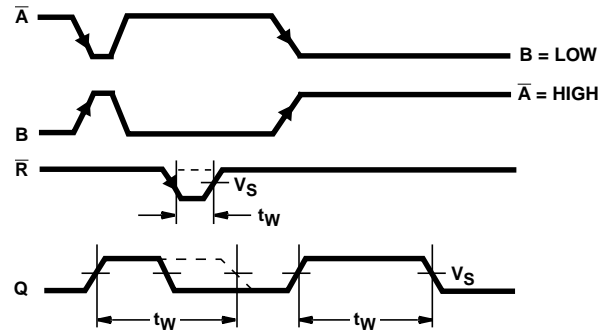
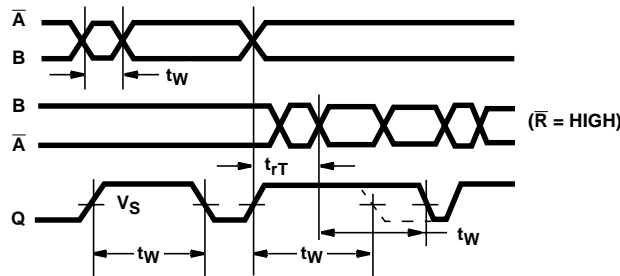


FIGURE 2. OUTPUT PULSE CONTROL USING RESET INPUT (\bar{R}) FOR 423



NOTE: Output pulse control using retrigger pulse for 123 and 423.

FIGURE 3. TRIGGERING OF ONE SHOT BY INPUT \bar{A} OR INPUT B FOR A PERIOD t_w

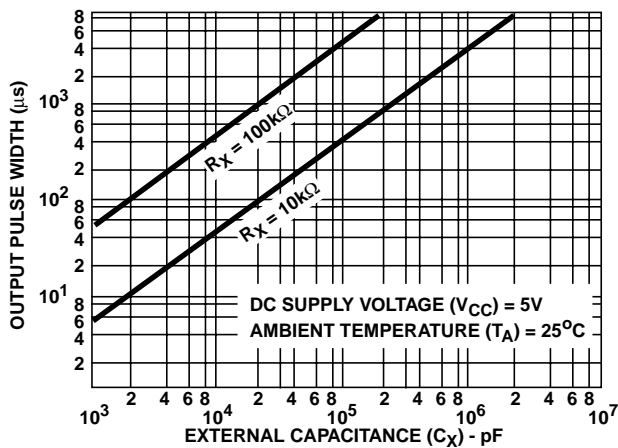


FIGURE 4. TYPICAL OUTPUT PULSE WIDTH AS A FUNCTION OF C_x FOR $R_x = 10k\Omega$ AND $100k\Omega$

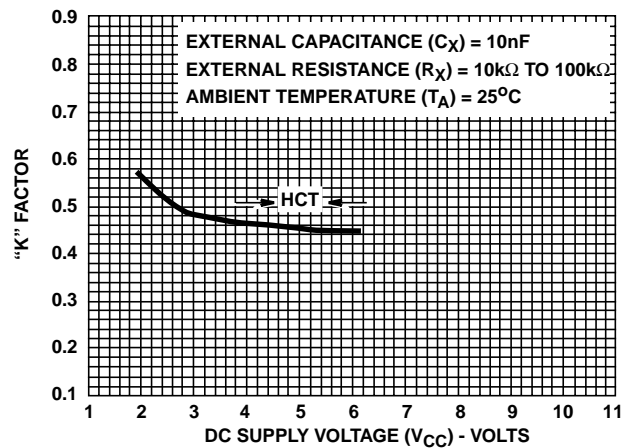


FIGURE 5. TYPICAL "K" FACTOR AS A FUNCTION OF V_{CC}

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-8684701EA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684701EA CD54HC123F3A	Samples
5962-8970001EA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8970001EA CD54HCT123F3A	Samples
CD54HC123F	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD54HC123F	Samples
CD54HC123F3A	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8684701EA CD54HC123F3A	Samples
CD54HCT123F3A	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8970001EA CD54HCT123F3A	Samples
CD74HC123E	LIFEBUY	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC123E	
CD74HC123EE4	LIFEBUY	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC123E	
CD74HC123M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	HC123M	Samples
CD74HC123M96E4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC123M	Samples
CD74HC123M96G4	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC123M	Samples
CD74HC123NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC123M	Samples
CD74HC123PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	HJ123	Samples
CD74HC123PWRG4	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ123	Samples
CD74HC423E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC423E	Samples
CD74HC423M96	LIFEBUY	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC423M	
CD74HC423M96G4	LIFEBUY	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC423M	
CD74HC423NSR	LIFEBUY	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC423M	
CD74HCT123E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT123E	Samples
CD74HCT123M96	LIFEBUY	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT123M	
CD74HCT423E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT423E	Samples
CD74HCT423M96	LIFEBUY	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT423M	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CD74HCT423M96G4	LIFEBUY	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT423M	

(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.

OBSELETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

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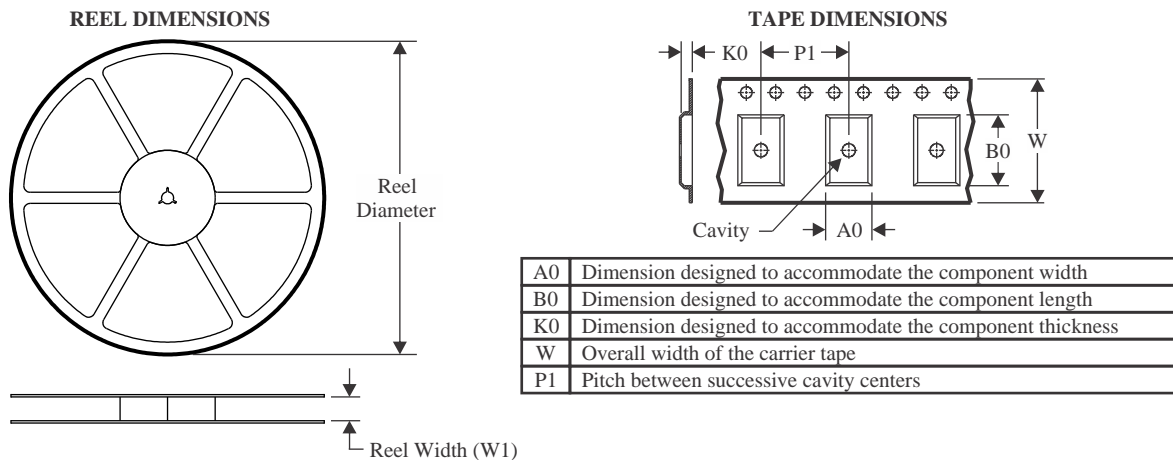
OTHER QUALIFIED VERSIONS OF CD54HC123, CD54HCT123, CD74HC123, CD74HCT123 :

● Catalog : [CD74HC123](#), [CD74HCT123](#)

- Military : [CD54HC123](#), [CD54HCT123](#)

NOTE: Qualified Version Definitions:

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

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*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
CD74HC123M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC123M96G4	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC123NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
CD74HC123PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC123PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC123PWRG4	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC423M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC423NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
CD74HCT123M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HCT423M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC123M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74HC123M96G4	SOIC	D	16	2500	340.5	336.1	32.0
CD74HC123NSR	SO	NS	16	2000	356.0	356.0	35.0
CD74HC123PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
CD74HC123PWR	TSSOP	PW	16	2000	364.0	364.0	27.0
CD74HC123PWRG4	TSSOP	PW	16	2000	356.0	356.0	35.0
CD74HC423M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74HC423NSR	SO	NS	16	2000	356.0	356.0	35.0
CD74HCT123M96	SOIC	D	16	2500	340.5	336.1	32.0
CD74HCT423M96	SOIC	D	16	2500	340.5	336.1	32.0

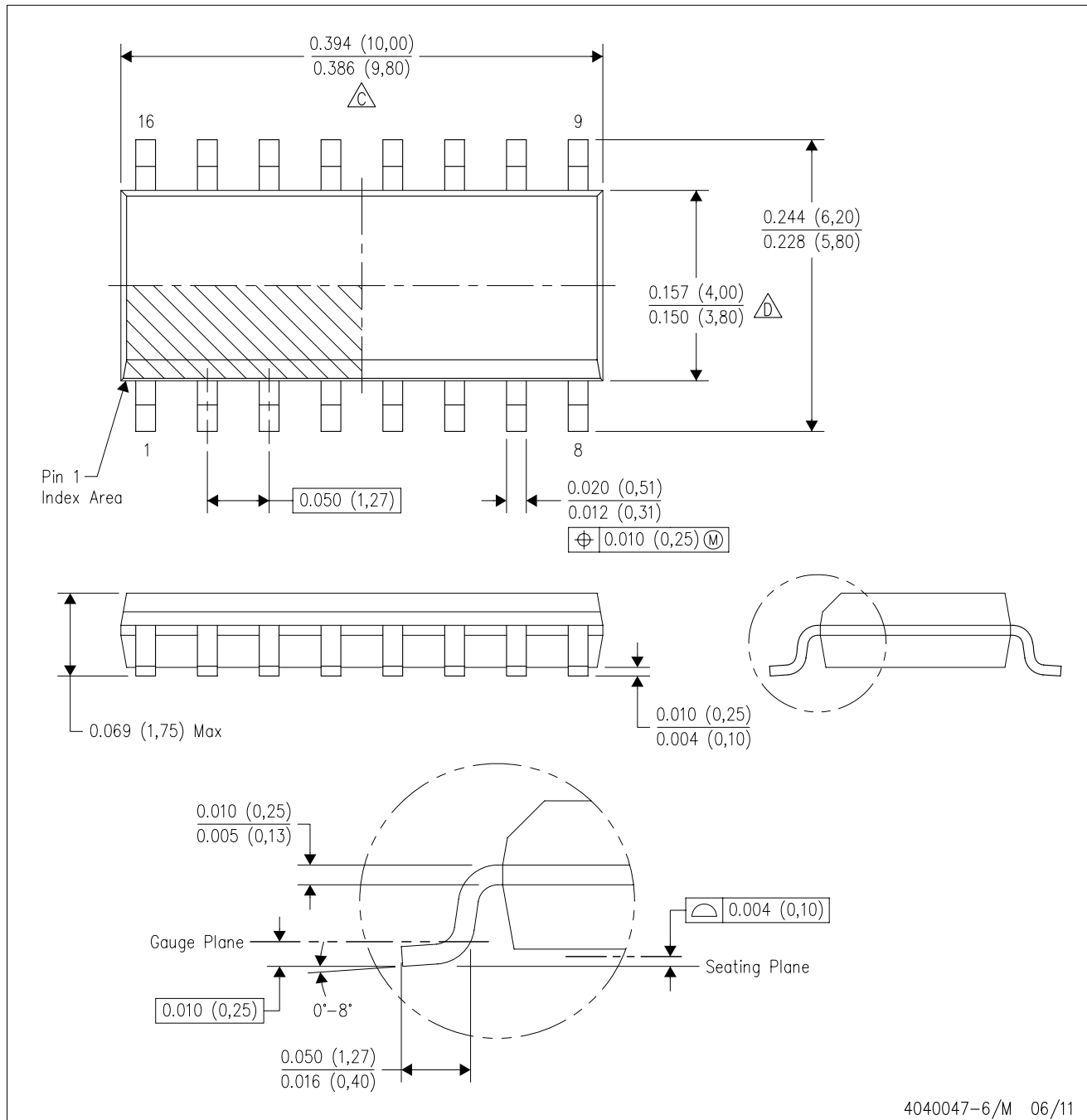
TUBE


*All dimensions are nominal

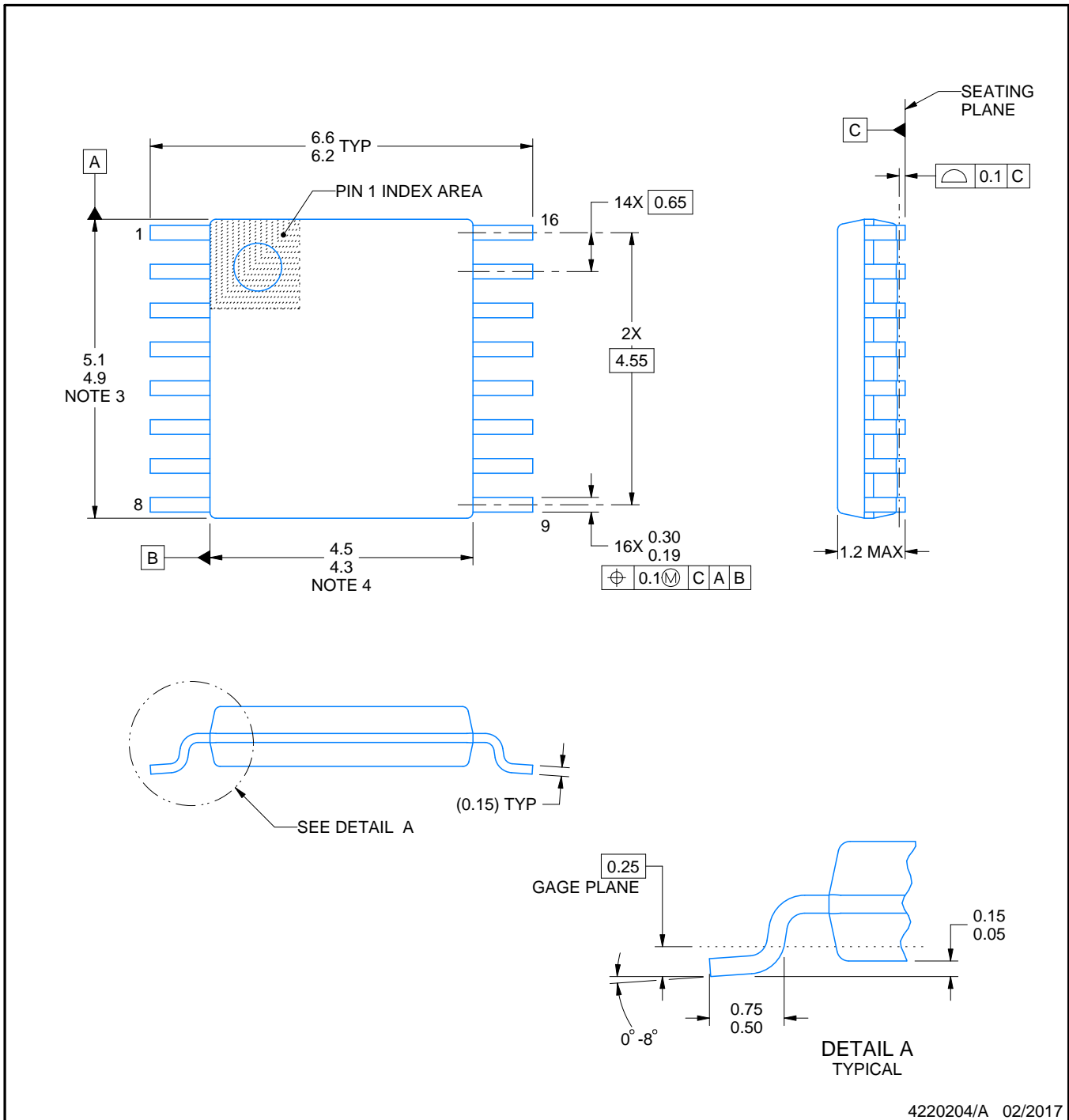
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74HC123E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC123E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC123EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC123EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC423E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC423E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT123E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT123E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT423E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT423E	N	PDIP	16	25	506	13.97	11230	4.32

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.
 - 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.
 - 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.



4220204/A 02/2017

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220204/A 02/2017

NOTES: (continued)

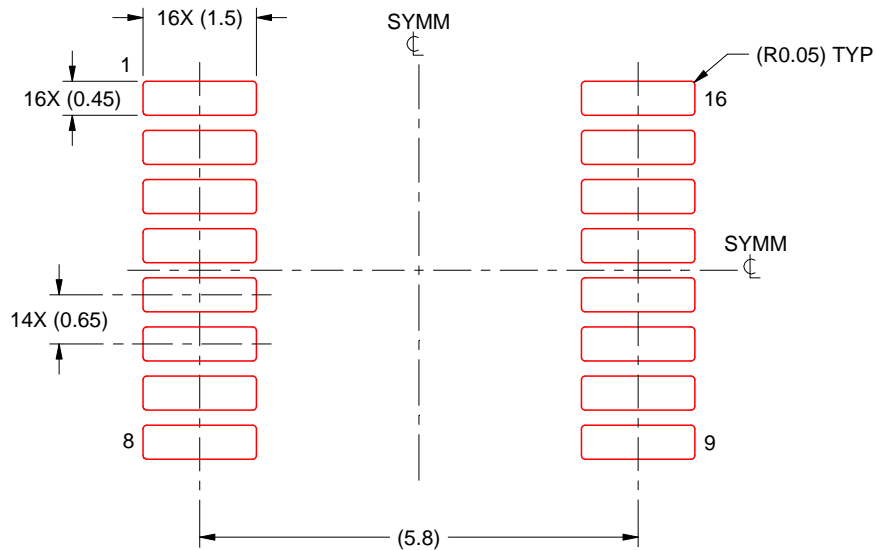
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220204/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN

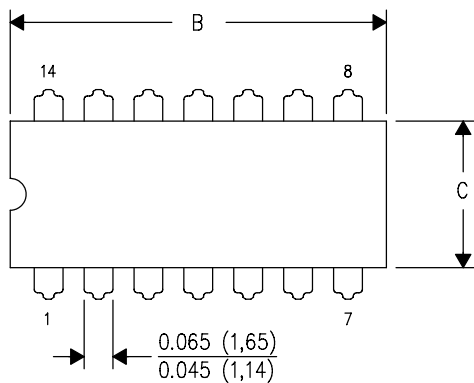


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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)



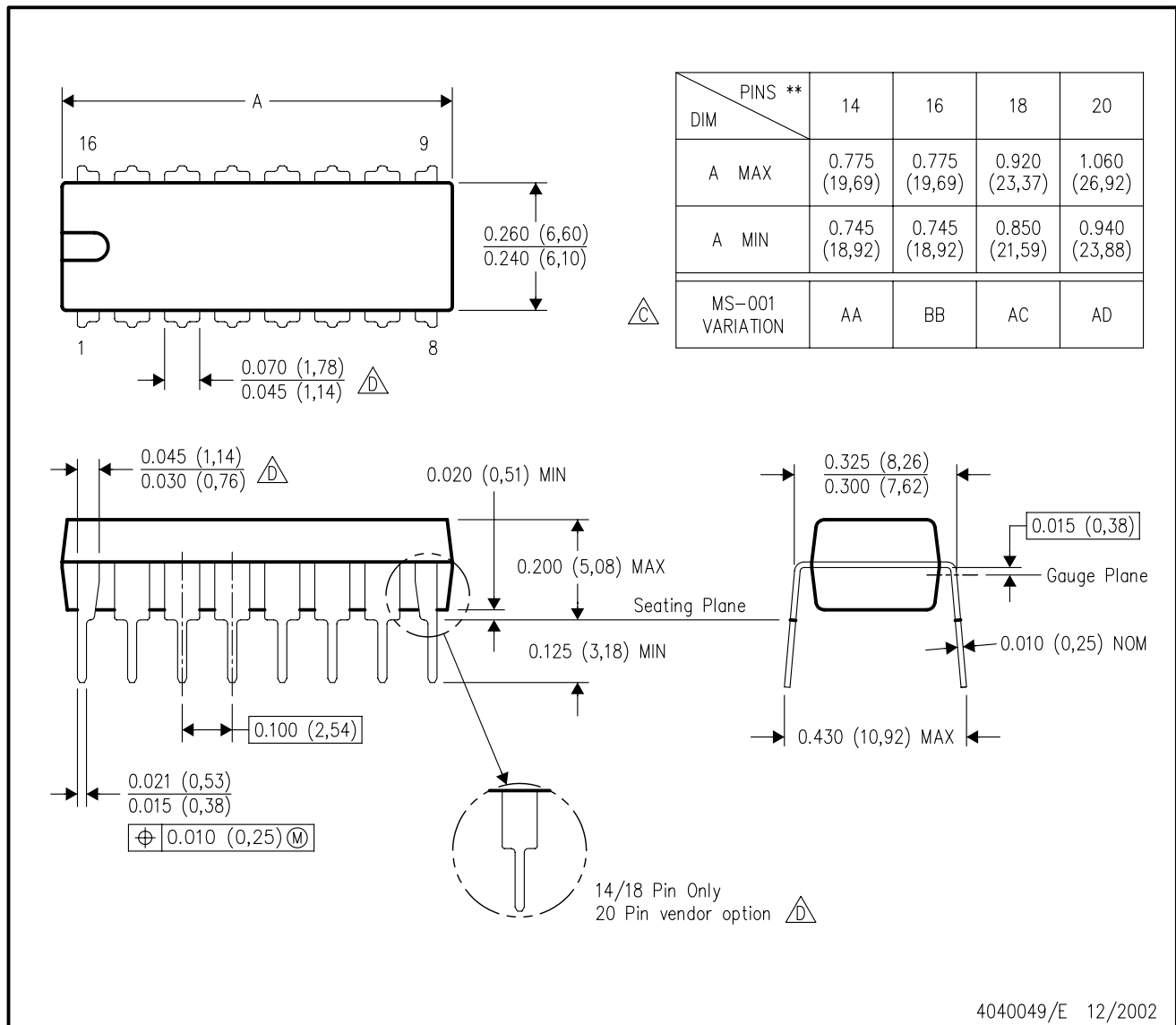
4040083/F 03/03

- 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.

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.



PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

SOP



NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.

EXAMPLE BOARD LAYOUT

NS0016A

SOP - 2.00 mm max height

SOP



SOLDER MASK DETAILS

4220735/A 12/2021

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

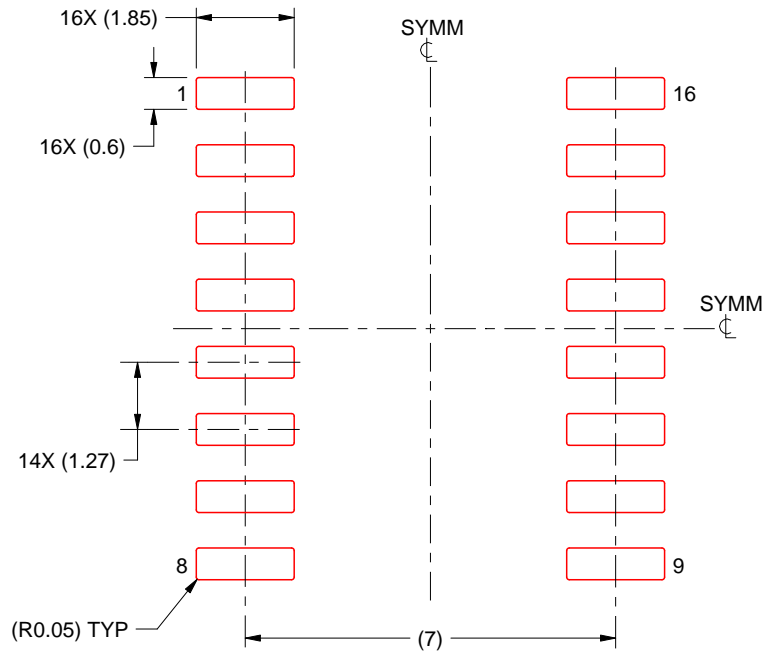
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

NS0016A

SOP - 2.00 mm max height

SOP



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:7X

4220735/A 12/2021

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

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