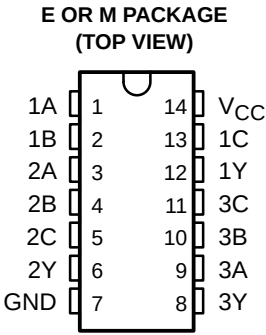


CD74ACT10

TRIPLE 3-INPUT POSITIVE-NAND GATES

SCHS316 – NOVEMBER 2002

- Inputs Are TTL-Voltage Compatible
- Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption
- Balanced Propagation Delays
- ± 24 -mA Output Drive Current
 - Fanout to 15 F Devices
- SCR Latchup-Resistant CMOS Process and Circuit Design
- Exceeds 2-kV ESD Protection Per MIL-STD-883, Method 3015



description/ordering information

The CD74ACT10 contains three independent 3-input NAND gates. The device performs the Boolean functions $Y = A \cdot B \cdot C$ or $Y = \overline{A} + \overline{B} + \overline{C}$ in positive logic.

ORDERING INFORMATION

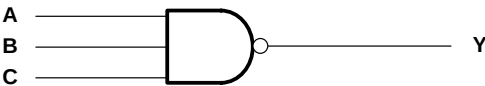
T _A	PACKAGE [†]		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	PDIP – E	Tube	CD74ACT10E	CD74ACT10E
	SOIC – M	Tube	CD74ACT10M	ACT10M
		Tape and Reel	CD74ACT10M96	

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

FUNCTION TABLE (each gate)

INPUTS			OUTPUT
A	B	C	Y
H	H	H	L
L	X	X	H
X	L	X	H
X	X	L	H

logic diagram, each gate (positive logic)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2002, Texas Instruments Incorporated

CD74ACT10

TRIPLE 3-INPUT POSITIVE-NAND GATES

SCHS316 – NOVEMBER 2002

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V_{CC}	–0.5 V to 6 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V_{CC} or GND	±100 mA
Package thermal impedance, θ_{JA} (see Note 2): E package	80°C/W
M package	86°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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

	$T_A = 25^\circ\text{C}$		–55°C to 125°C		–40°C to 85°C		UNIT
	MIN	MAX	MIN	MAX	MIN	MAX	
V_{CC} Supply voltage	4.5	5.5	4.5	5.5	4.5	5.5	V
V_{IH} High-level input voltage	2		2		2		V
V_{IL} Low-level input voltage		0.8		0.8		0.8	V
V_I Input voltage	0	V_{CC}	0	V_{CC}	0	V_{CC}	V
V_O Output voltage	0	V_{CC}	0	V_{CC}	0	V_{CC}	V
I_{OH} High-level output current		–24		–24		–24	mA
I_{OL} Low-level output current		24		24		24	mA
$\Delta t/\Delta v$ Input transition rise or fall rate		10		10		10	ns/V

NOTE 3: All 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		–55°C to 125°C		–40°C to 85°C		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = –50 µA	4.5 V	4.4		4.4		4.4		V
		I _{OH} = –24 mA	4.5 V	3.94		3.7		3.8		
		I _{OH} = –50 mA [†]	5.5 V			3.85				
		I _{OH} = –75 mA [†]	5.5 V					3.85		
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 50 µA	4.5 V		0.1		0.1		0.1	V
		I _{OL} = 24 mA	4.5 V		0.36		0.5		0.44	
		I _{OL} = 50 mA [†]	5.5 V				1.65			
		I _{OL} = 75 mA [†]	5.5 V						1.65	
I _I	V _I = V _{CC} or GND		5.5 V	±0.1		±1		±1		µA
I _{CC}	V _I = V _{CC} or GND, I _O = 0		5.5 V	4		80		40		µA
ΔI _{CC} [‡]	V _I = V _{CC} – 2.1 V		4.5 V to 5.5 V	2.4		3		2.8		mA
C _i				10		10		10		pF

[†] Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 50-Ω transmission-line drive capability at 85°C and 75-Ω transmission-line drive capability at 125°C.

[‡] Additional quiescent supply current per input pin, TTL inputs high, 1 unit load

ACT INPUT LOAD TABLE

INPUT	UNIT LOAD
A, B, or C	0.19

Unit load is ΔI_{CC} limit specified in electrical characteristics table (e.g., 2.4 mA at 25°C).

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	–55°C to 125°C		–40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
t _{PLH}	A, B, or C	Y	3.4	13.5	3.5	12.3	ns
t _{PHL}			3.4	13.5	3.5	12.3	

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

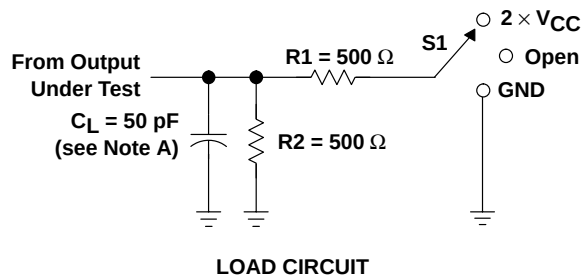
PARAMETER		TYP	UNIT
C _{pd}	Power dissipation capacitance	50	pF

CD74ACT10

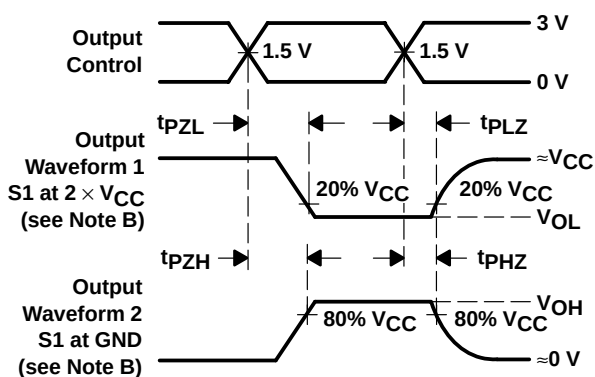
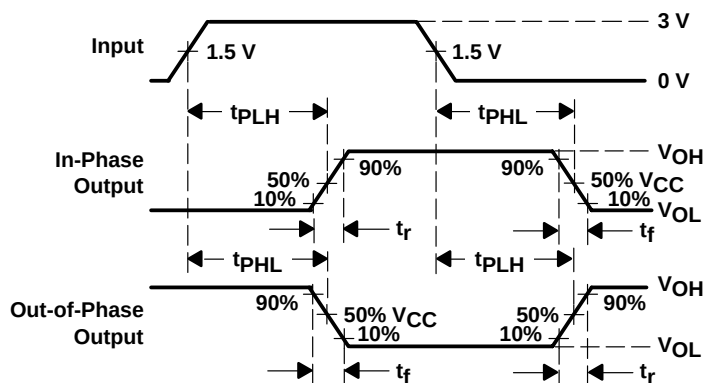
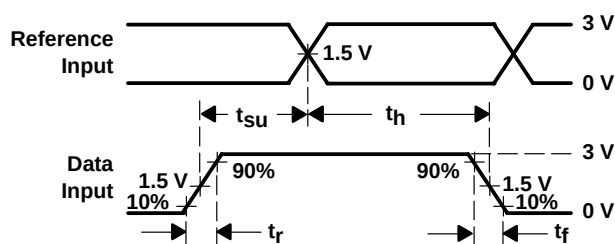
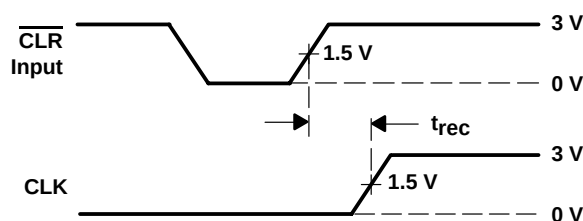
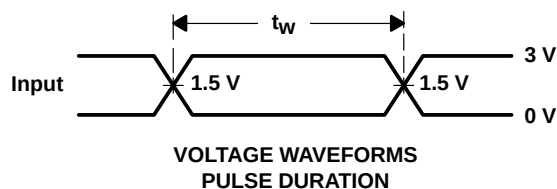
TRIPLE 3-INPUT POSITIVE-NAND GATES

SCHS316 – NOVEMBER 2002

PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	$2 \times V_{CC}$
t_{PHZ}/t_{PZH}	GND



- NOTES:
- C_L includes probe and test-fixture capacitance.
 - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 3 \text{ ns}$, $t_f = 3 \text{ ns}$. Phase relationships between waveforms are arbitrary.
 - For clock inputs, f_{max} is measured with the input duty cycle at 50%.
 - The outputs are measured one at a time with one input transition per measurement.
 - t_{PLH} and t_{PHL} are the same as t_{pd} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CD74ACT10E	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74ACT10E
CD74ACT10E.A	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74ACT10E
CD74ACT10M	Obsolete	Production	SOIC (D) 14	-	-	Call TI	Call TI	-55 to 125	ACT10M
CD74ACT10M96	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT10M
CD74ACT10M96.A	Active	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT10M

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

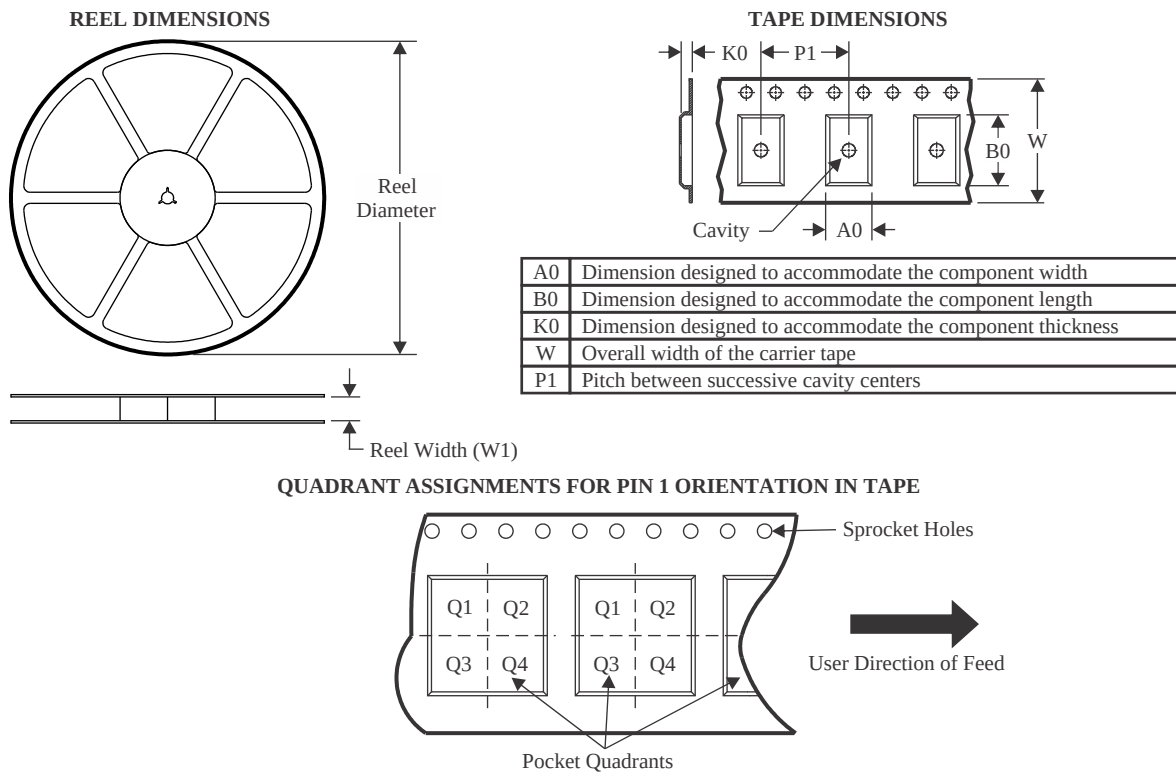
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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.

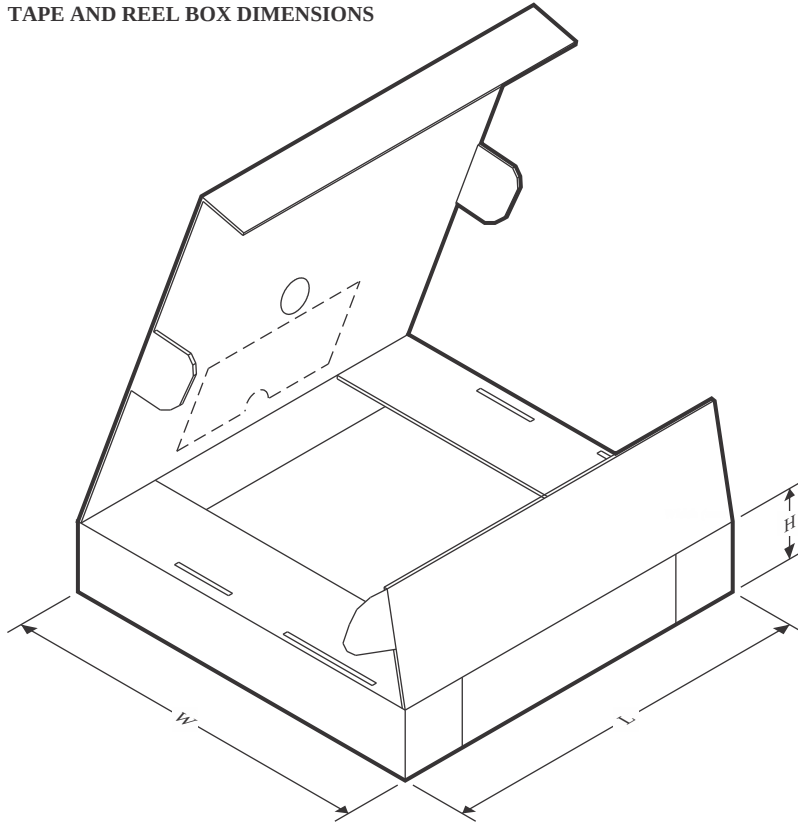
TAPE AND REEL INFORMATION



*All dimensions are nominal

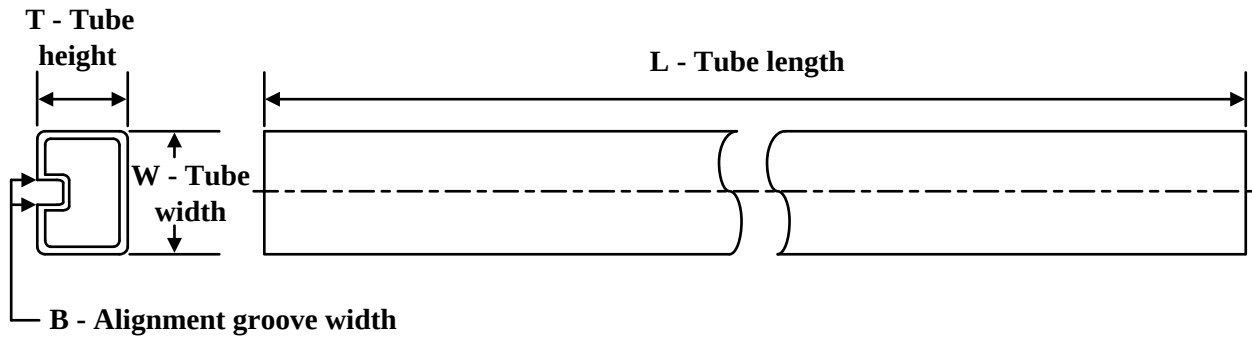
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74ACT10M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



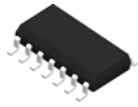
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74ACT10M96	SOIC	D	14	2500	353.0	353.0	32.0

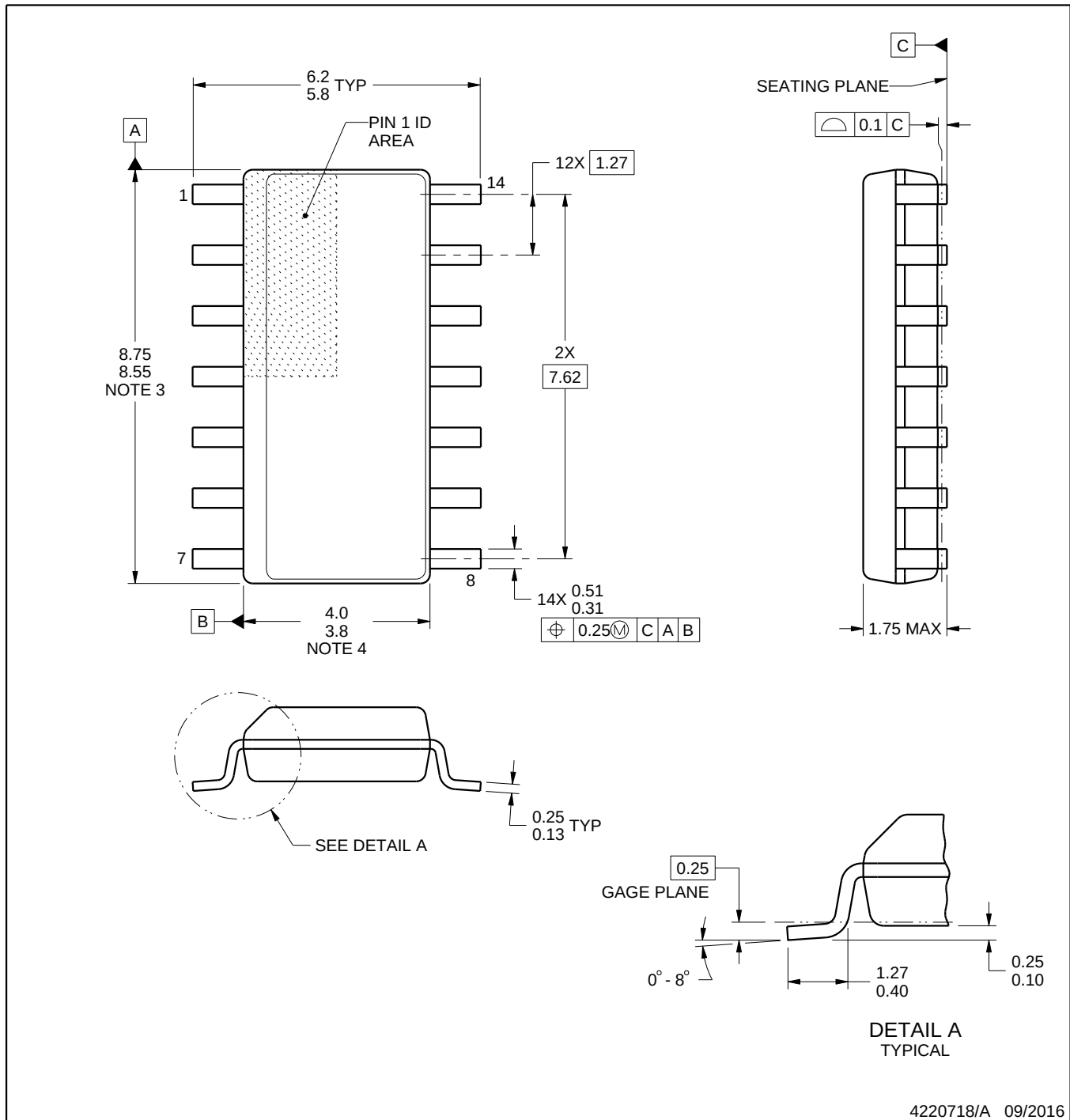
TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74ACT10E	N	PDIP	14	25	506	13.97	11230	4.32
CD74ACT10E	N	PDIP	14	25	506	13.97	11230	4.32
CD74ACT10E.A	N	PDIP	14	25	506	13.97	11230	4.32
CD74ACT10E.A	N	PDIP	14	25	506	13.97	11230	4.32

D0014A**PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT

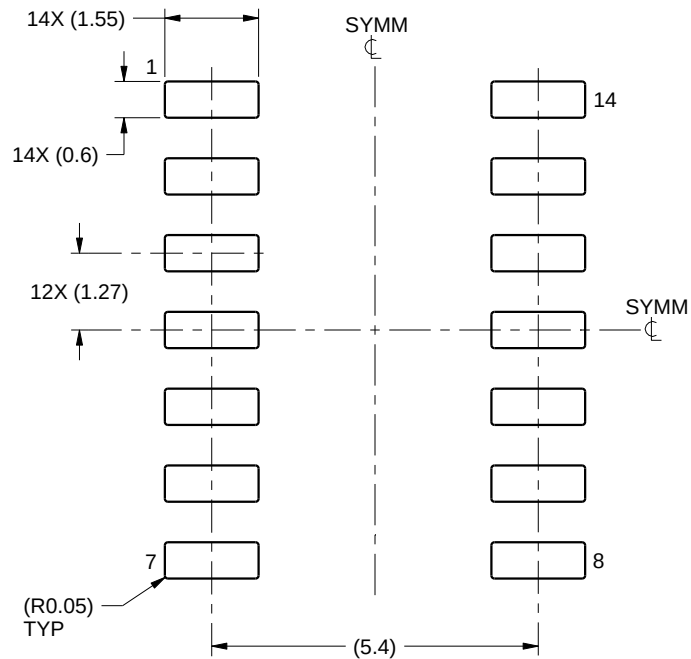


EXAMPLE BOARD LAYOUT

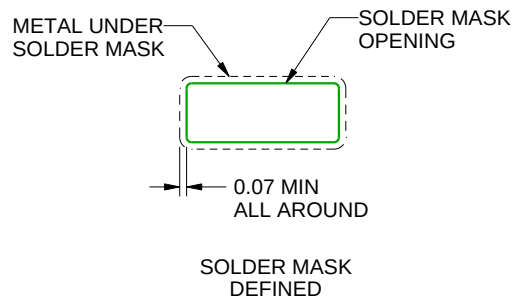
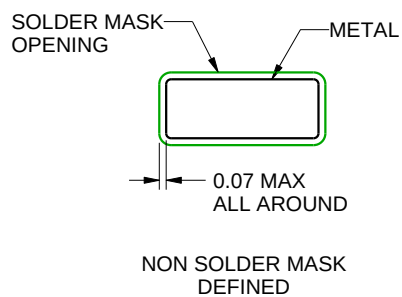
D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

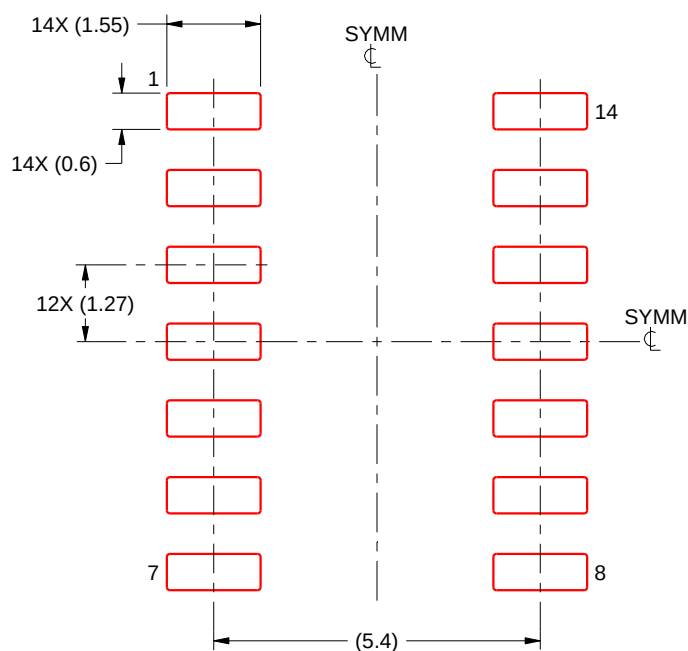
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

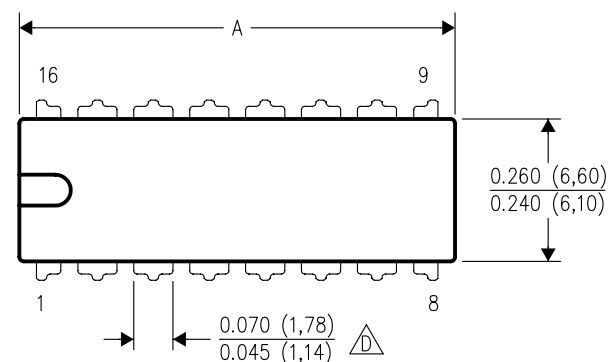
NOTES: (continued)

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.

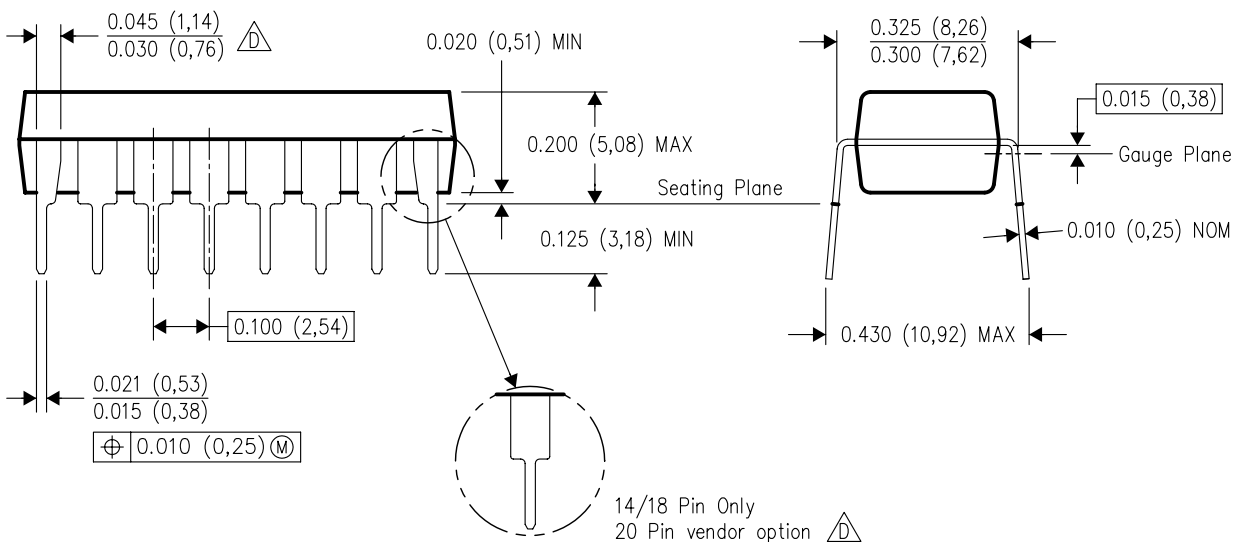
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



DIM \ PINS **	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



4040049/E 12/2002

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.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated