

SN74AHCT174 具有清零功能的六路 D 类触发器

1 特性

- 输入兼容 TTL 电压
- 包含 6 个具有单轨输出的触发器
- 闩锁性能超过 JESD 17 所规定的 250 mA

2 应用

- 缓冲器/存储寄存器
- 移位寄存器
- 图形发生器

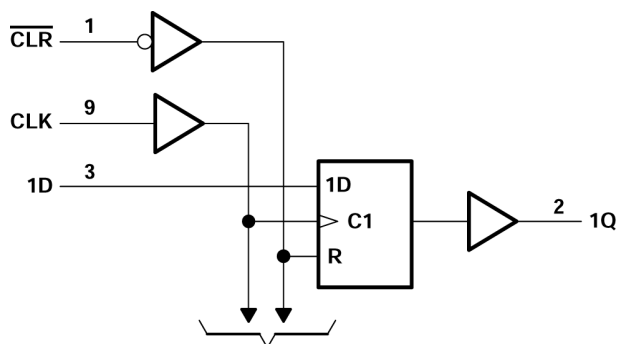
3 说明

这些正边沿触发式 D 型触发器具有直接清零 ($\overline{\text{CLR}}$) 输入。

封装信息

器件型号	封装 1	封装尺寸 (标称值)
SN74AHCT174	D (SOIC, 16)	9.00 mm × 3.90 mm
	DB (SSOP, 16)	6.2mm × 5.3mm
	N (PDIP, 16)	19.3mm × 6.35mm
	NS (SOP, 16)	10.3mm × 5.3mm
	PW (TSSOP, 16)	5.00mm × 4.40mm

- 如需了解所有可用封装, 请参阅数据表末尾的可订购产品附录。



To Five Other Channels

图 3-1. 逻辑图 (正逻辑)



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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision F (April 2002) to Revision G (May 2023)

Page

• 添加了应用、封装信息表、引脚功能表和热性能信息表.....	1
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5 Pin Configuration and Functions

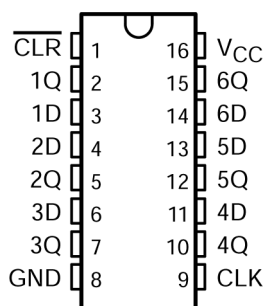


图 5-1. Package SN74AHCT174 D, DB, DGV, N, NS, or PW Package (Top View)

表 5-1. Pin Functions

PIN		I/O ⁽¹⁾	DESCRIPTION
NO.	NAME		
1	CLR	I	Clear all channels, active low
2	1Q	O	Channel 1, Q output
3	1D	I	Channel 1, D input
4	2D	I	Channel 2, D input
5	2Q	O	Channel 2, Q output
6	3D	I	Channel 3, D input
7	3Q	O	Channel 3, Q output
8	GND	—	Ground
9	CLK	I	Clock all channels, rising edge triggered
10	4Q	O	Channel 4, Q output
11	4D	I	Channel 4, D input
12	5Q	O	Channel 5, Q output
13	5D	I	Channel 5, D input
14	6D	I	Channel 6, D input
15	6Q	O	Channel 6, Q output
16	V _{CC}	—	Positive supply

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT
V_{CC}	Supply voltage range	– 0.5	7	V
V_I ¹	Input voltage range	– 0.5	7	V
V_O ¹	Output voltage range	– 0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current	$(V_I < 0)$		– 20 mA
I_{OK}	Output clamp current	$(V_O < 0 \text{ or } V_O > V_{CC})$		±20 mA
I_O	Continuous output current	$(V_O = 0 \text{ to } V_{CC})$		±25 mA
	Continuous current through V_{CC} or GND			±50 mA
T_{stg}	Storage temperature range	– 65	150	°C

- (1) 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.
- (2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge		
	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2000	V
	Machine Model (MM), per JEDEC specification	±200	
	Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002 ⁽²⁾	±1000	

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

(see [Note 1](#))

		SN74AHCT174		UNIT
		MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	V
V_{IH}	High-level input voltage	2		V
V_{IL}	Low-level input voltage		0.8	V
V_I	Input voltage	0	5.5	V
V_O	Output voltage	0	V_{CC}	V
I_{OH}	High-level output current		– 8	mA
I_{OL}	Low-level output current		8	mA
$\Delta t/\Delta v$	Input transition rise or fall time		20	ns/V
T_A	Operating free-air temperature	– 40	85	°C

- (1) 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.

6.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25 °C			SN74AHCT174		UNIT
			MIN	TYP	MAX	MIN	MAX	
V _{OH}	I _{OH} = -50 μA	4.5 V	4.4	4.5		4.4		V
	I _{OH} = -8 mA		3.94			3.8		
V _{OL}	I _{OL} = 50 μA	4.5 V			0.1		0.1	V
	I _{OL} = 8 mA				0.36		0.44	
I _I	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1	μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V			4		40	μA
Δ I _{CC} ⁽¹⁾	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5	μA
C _i	V _I = V _{CC} or GND	5 V		2	10		10	pF

(1) 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}.

6.5 Timing Requirements

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted)

			T _A = 25°C		SN74AHCT174		UNIT
			MIN	MAX	MIN	MAX	
t _w	Pulse duration	CLR low	5		5		ns
		CLK high or low	5		5		
t _{su}	Setup time before CLK ↑	Data	5		5		ns
		CLR inactive	3.5		3.5		
t _h	Hold time, data after CLK ↑		0		0		ns

6.6 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see [Figure 7-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			SN74AHCT174		UNIT
				MIN	TYP	MAX	MIN	MAX	
f _{max}			C _L = 15 pF	100 ⁽¹⁾	135 ⁽¹⁾		80		MHz
			C _L = 50 pF	80	115		65		
t _{PHL}	CLR	Any Q	C _L = 15 pF		7.6 ⁽¹⁾	10.4 ⁽¹⁾	1	13	ns
t _{PLH}	CLK	Any Q	C _L = 15 pF		5.8 ⁽¹⁾	7.8 ⁽¹⁾	1	9	ns
t _{PHL}					5.8 ⁽¹⁾	7.8 ⁽¹⁾	1	9	
t _{PHL}	CLR	Any Q	C _L = 50 pF		8.1	11.4	1	13	ns
t _{PLH}	CLK	Any Q	C _L = 50 pF		6.3	8.8	1	10	ns
t _{PHL}					6.3	8.8	1	10	
t _{sk(o)}			C _L = 50 pF			1 ⁽²⁾		1	ns

(1) On products compliant to MIL-PRF-38535, this parameter is not production tested.

(2) On products compliant to MIL-PRF-38535, this parameter does not apply.

6.7 Noise Characteristics

V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C (see [Note 4](#))

PARAMETER		SN74AHCT174			UNIT
		MIN	TYP	MAX	
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}		0.8		V

SN74AHCT174

ZHCSS51G – JUNE 1998 – REVISED MAY 2023

 $V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see [Note 4](#))

PARAMETER		SN74AHCT174			UNIT
		MIN	TYP	MAX	
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		- 0.8		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}	4			V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

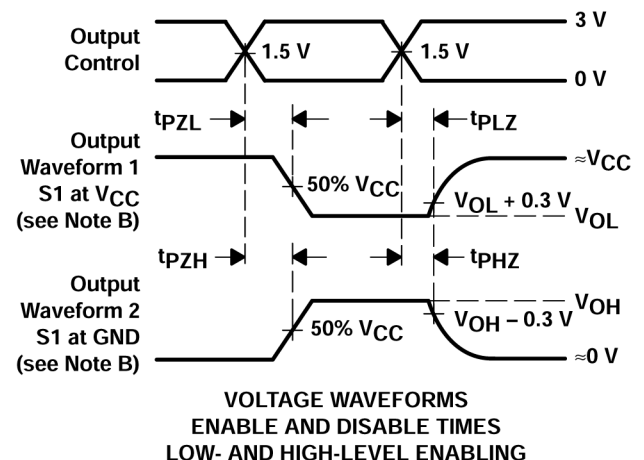
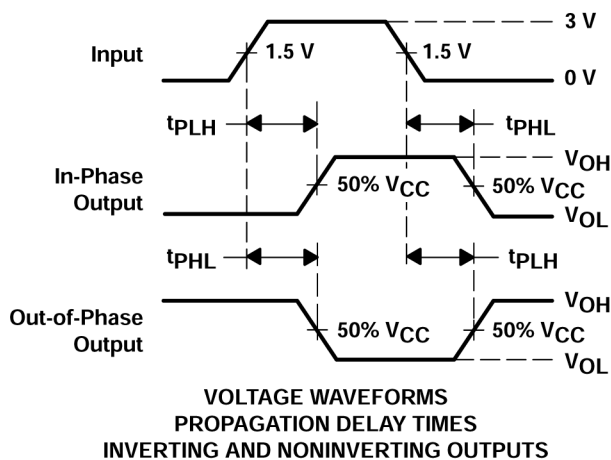
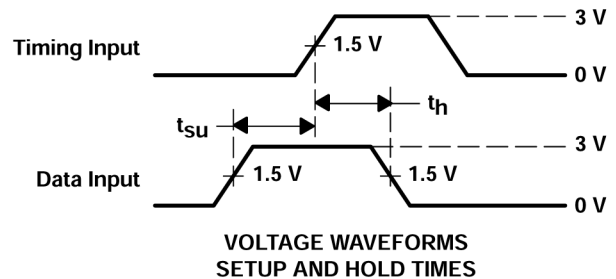
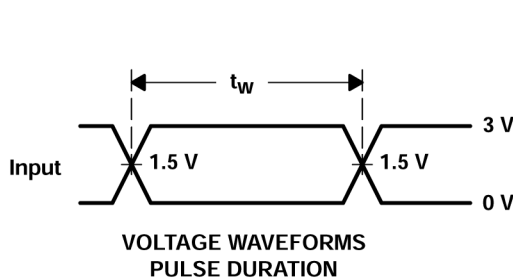
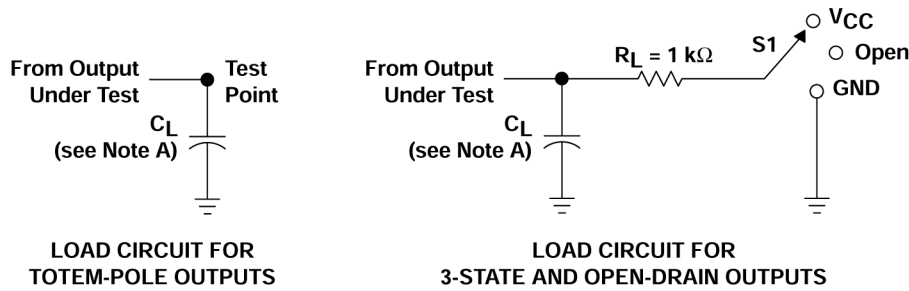
(1) Characteristics are for surface-mount packages only.

6.8 Operating Characteristics

 $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	28	pF

7 Parameter Measurement Information



- A. C_L includes probe and jig capacitance.
- B. 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.
- C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
- D. The outputs are measured one at a time with one input transition per measurement.

图 7-1. Load Circuit and Voltage Waveforms

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}

8 Detailed Description

8.1 Overview

Information at the data (D) inputs meeting the setup time requirements is transferred to the outputs on the positive-going edge of the clock (CLK) pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going edge of CLK. When CLK is at either the high or low level, the D input has no effect at the output.

8.2 Functional Block Diagram

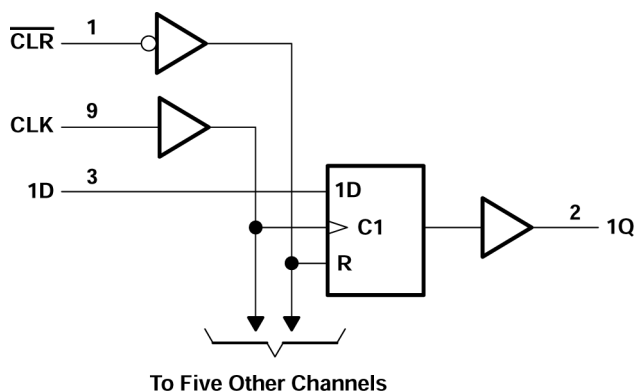


图 8-1. Logic Diagram (Positive Logic)

Pin numbers shown are for the D, DB, DGV, J, N, NS, PW, and W packages.

8.3 Device Functional Modes

表 8-1. Function Table

INPUTS ⁽¹⁾			OUTPUT
CLR	CLK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Qo

(1) H = High Voltage Level, L = Low Voltage Level, X = Do not Care, Z = High Impedance

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
SN74AHCT174D	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	-40 to 85	AHCT174	
SN74AHCT174DBR	ACTIVE	SSOP	DB	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB174	Samples
SN74AHCT174DR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT174	Samples
SN74AHCT174N	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT174N	Samples
SN74AHCT174NSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT174	Samples
SN74AHCT174PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB174	Samples

(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) **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.

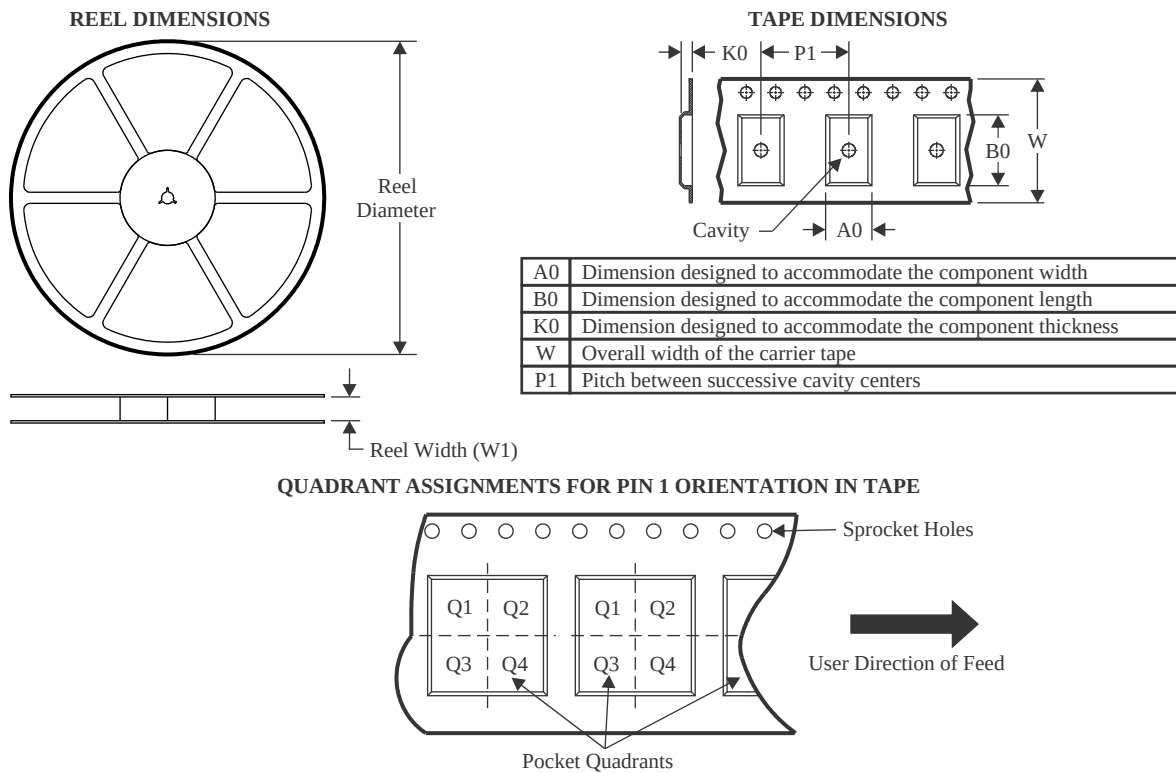
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(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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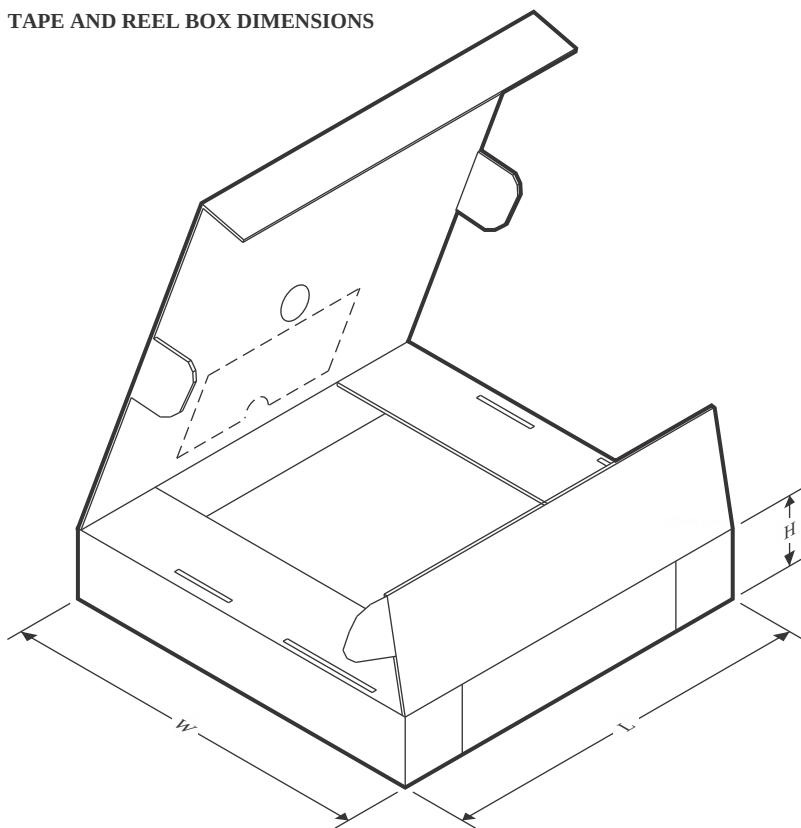
TAPE AND REEL INFORMATION



*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
SN74AHCT174DBR	SSOP	DB	16	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74AHCT174DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHCT174NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHCT174PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

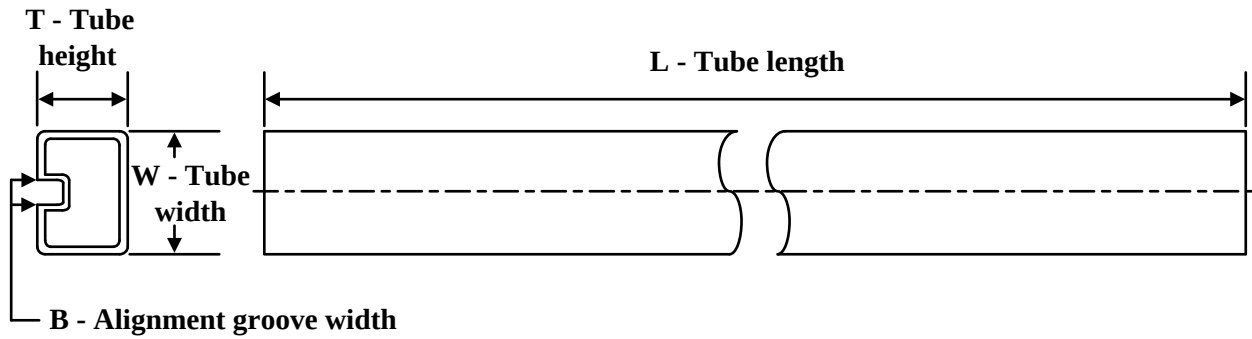
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT174DBR	SSOP	DB	16	2000	356.0	356.0	35.0
SN74AHCT174DR	SOIC	D	16	2500	340.5	336.1	32.0
SN74AHCT174NSR	SO	NS	16	2000	356.0	356.0	35.0
SN74AHCT174PWR	TSSOP	PW	16	2000	356.0	356.0	35.0

TUBE

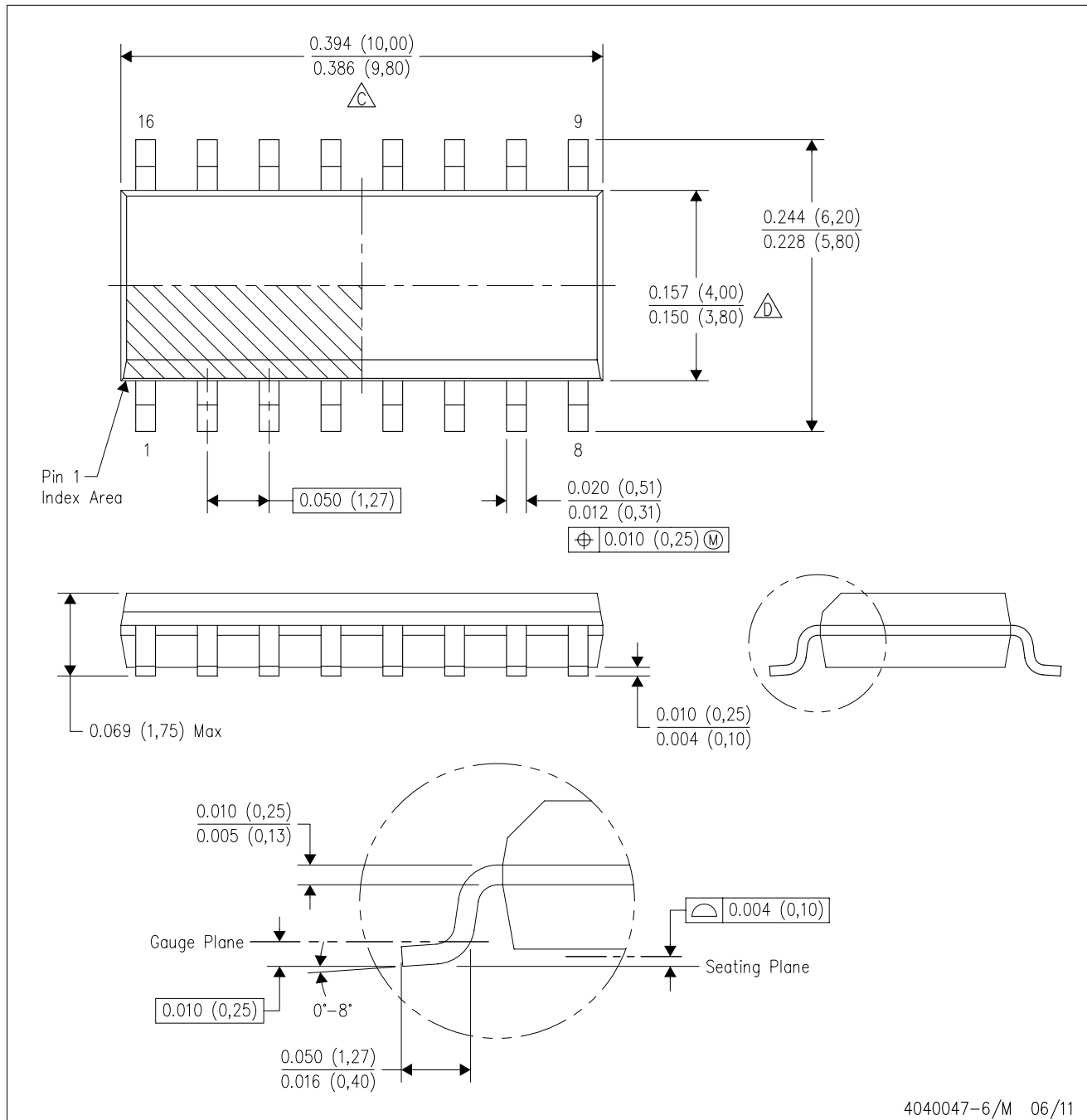


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74AHCT174N	N	PDIP	16	25	506	13.97	11230	4.32
SN74AHCT174N	N	PDIP	16	25	506	13.97	11230	4.32

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



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.



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



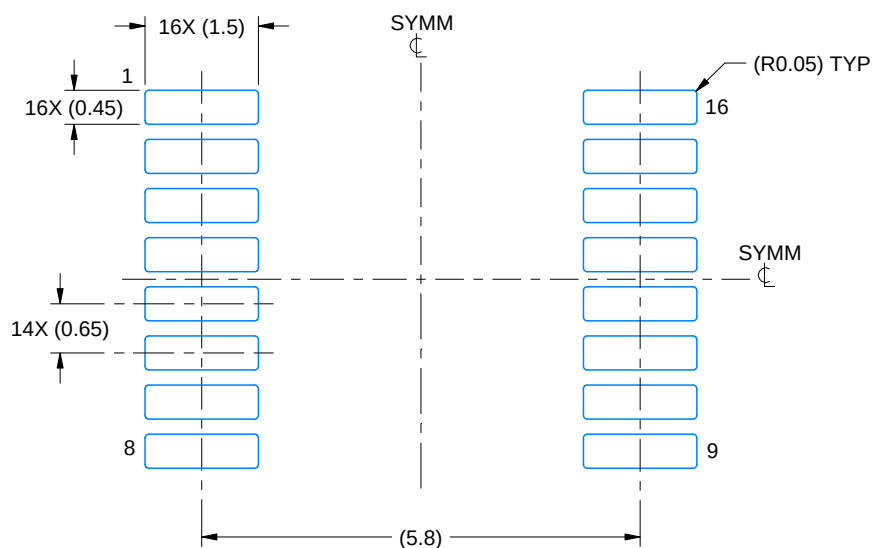
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or 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

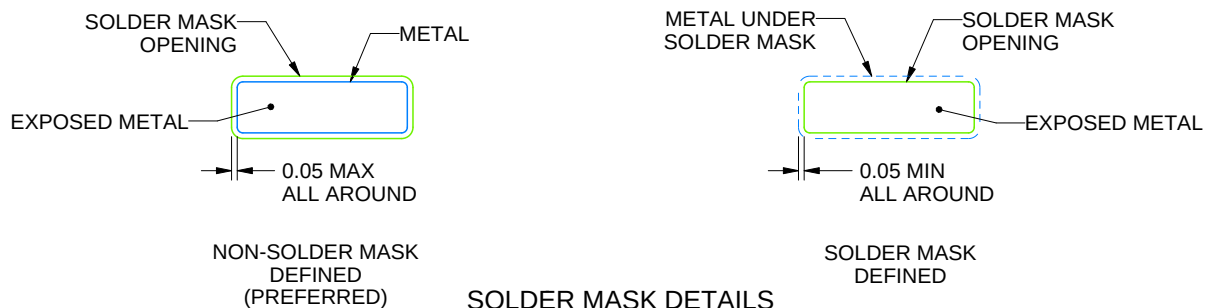
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220204/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

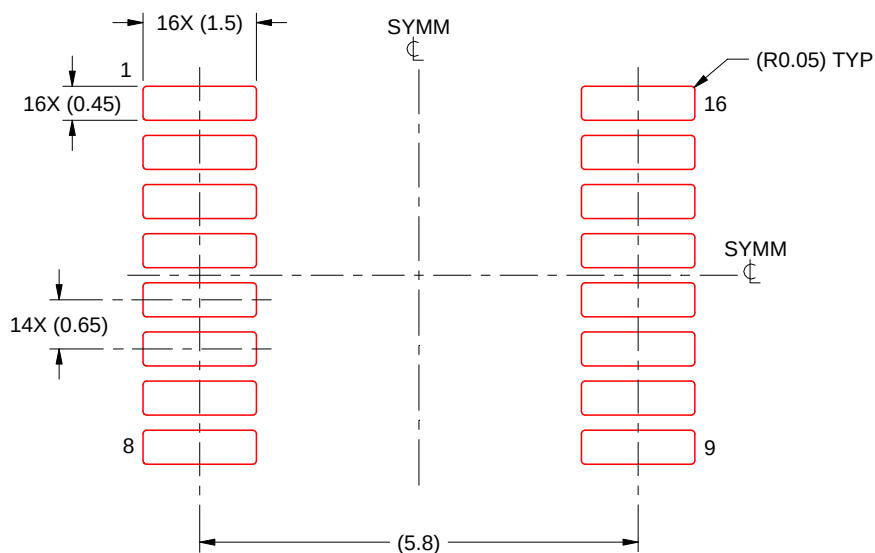
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

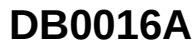


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

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.



SSOP - 2 mm max height

[illegible]

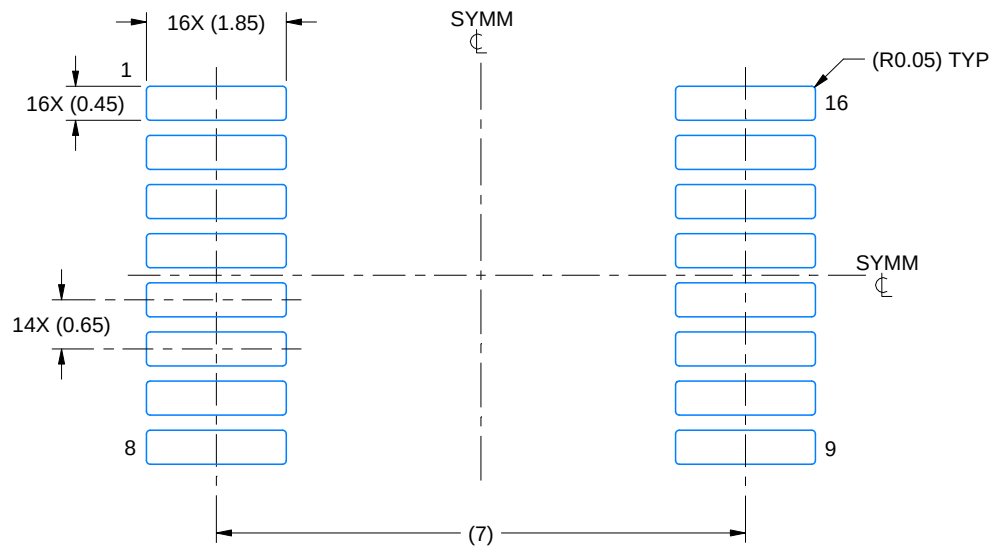
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

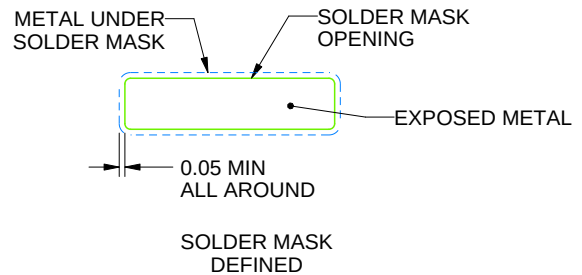
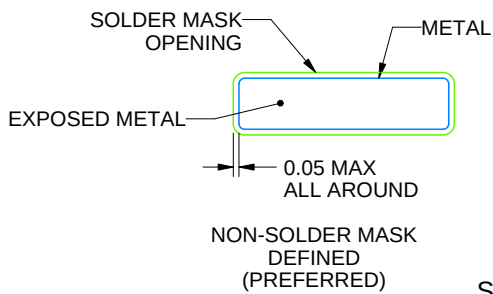
DB0016A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4220763/A 05/2022

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

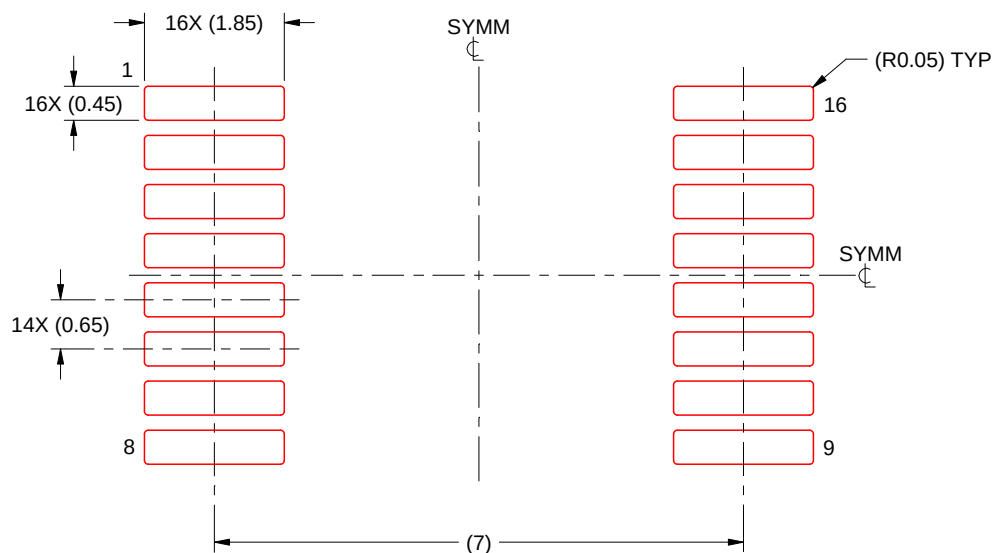
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0016A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4220763/A 05/2022

NOTES: (continued)

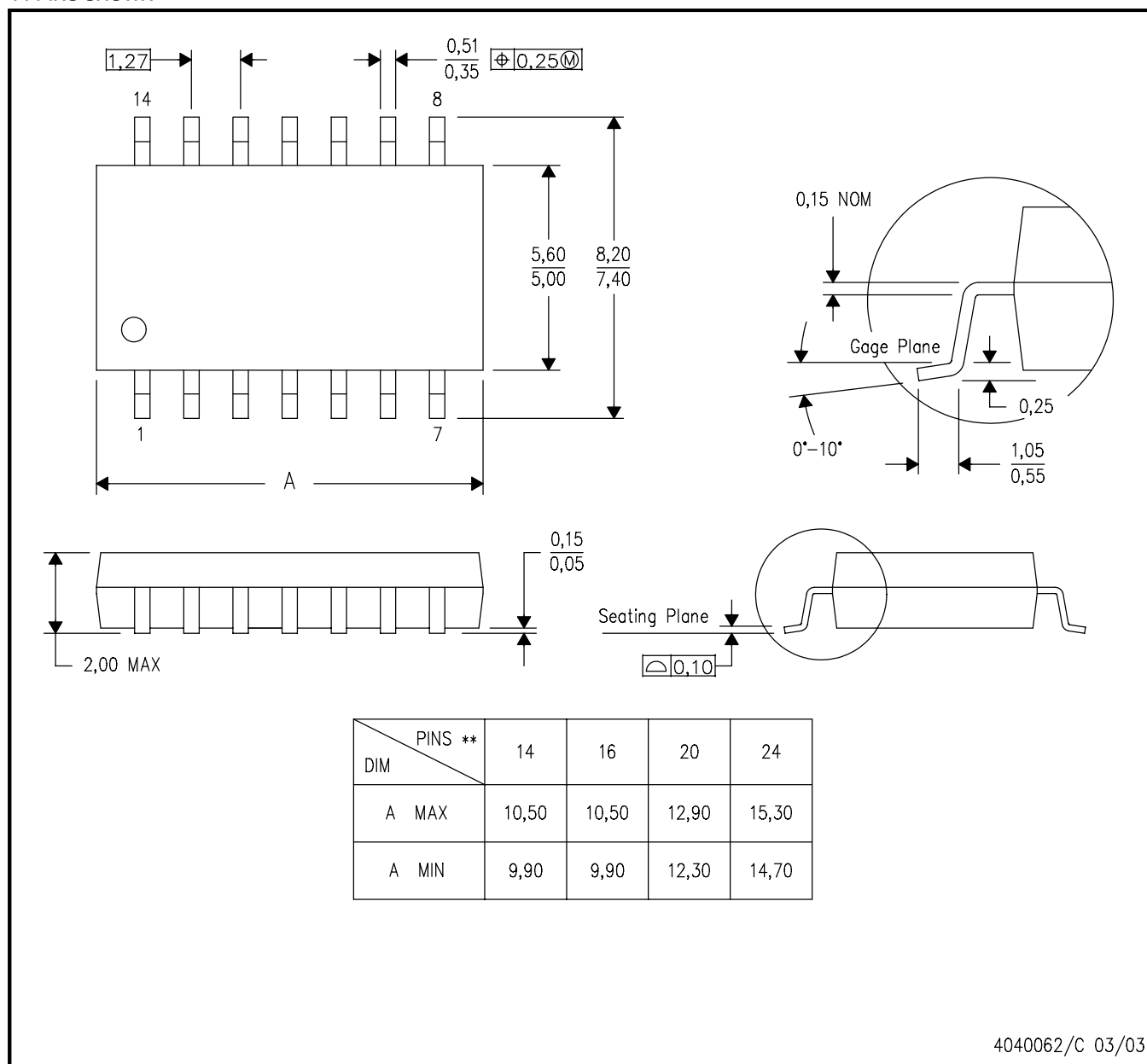
7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN

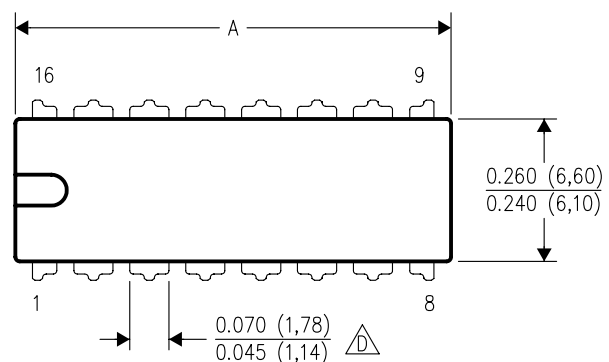


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

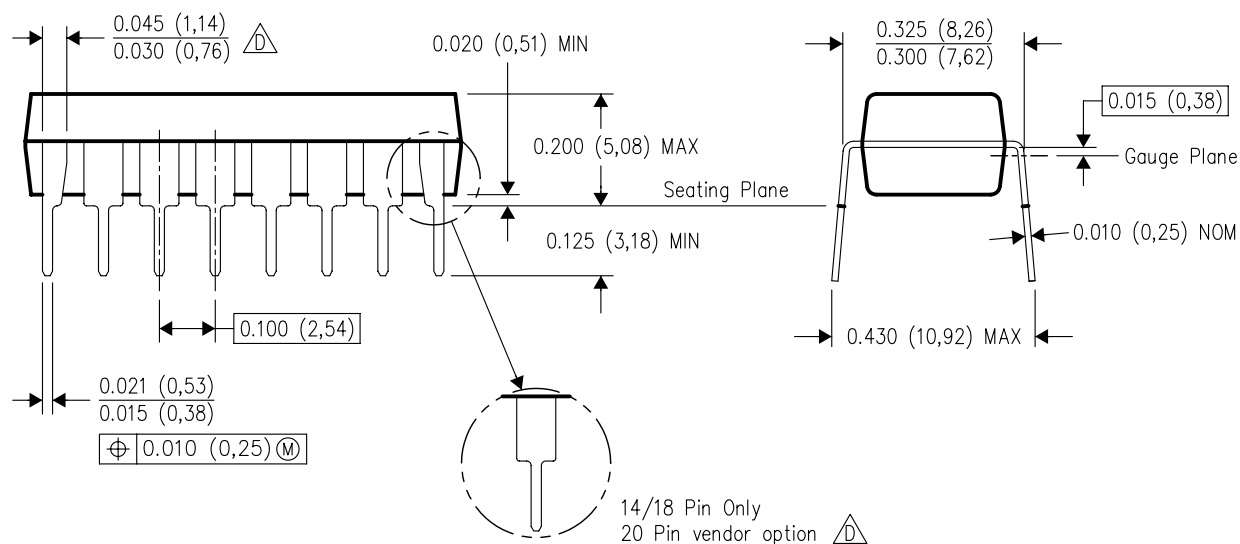
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE

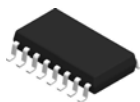


PINS **	14	16	18	20
DIM				
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - 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.

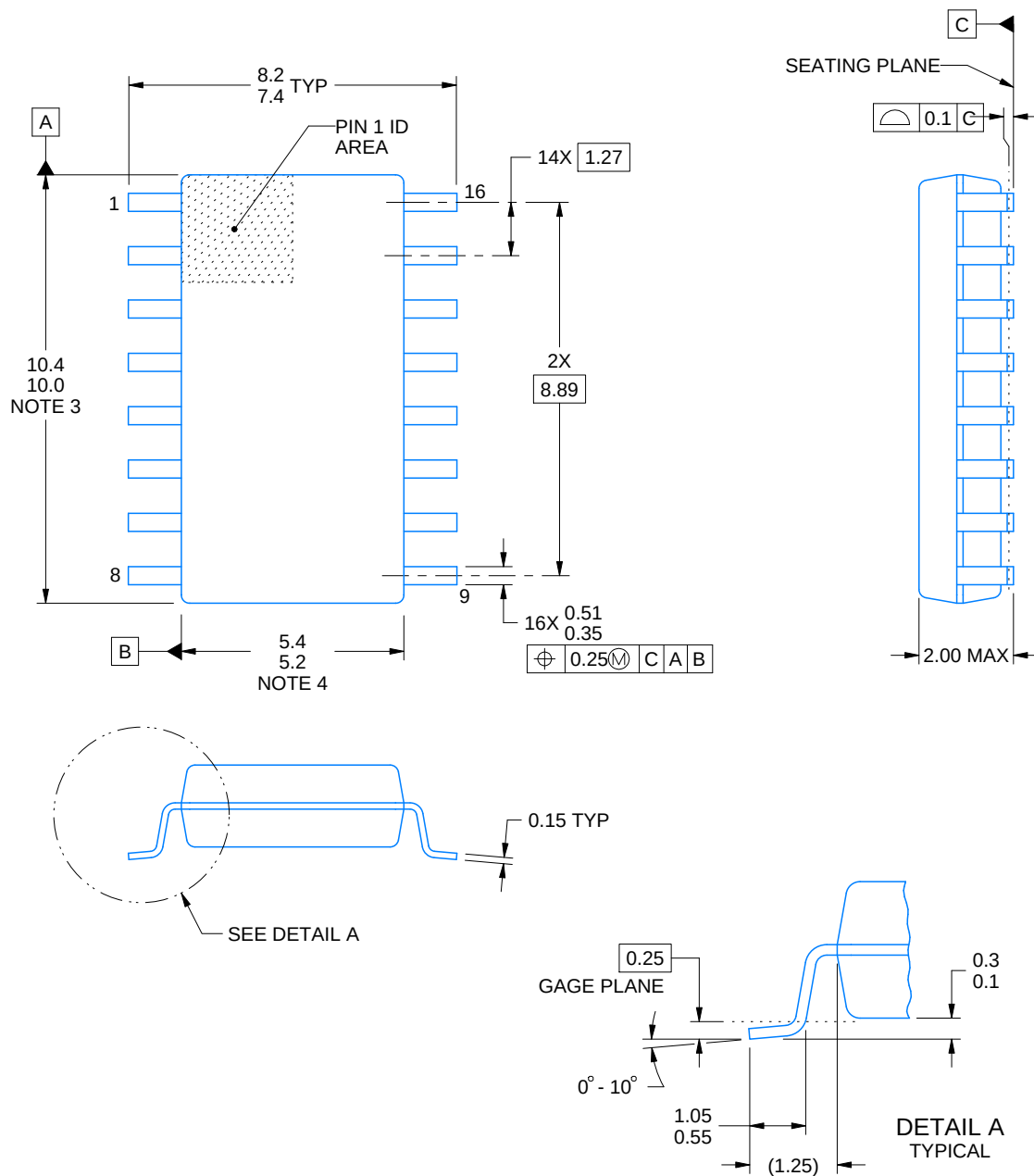


PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

SOP



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NOTES:

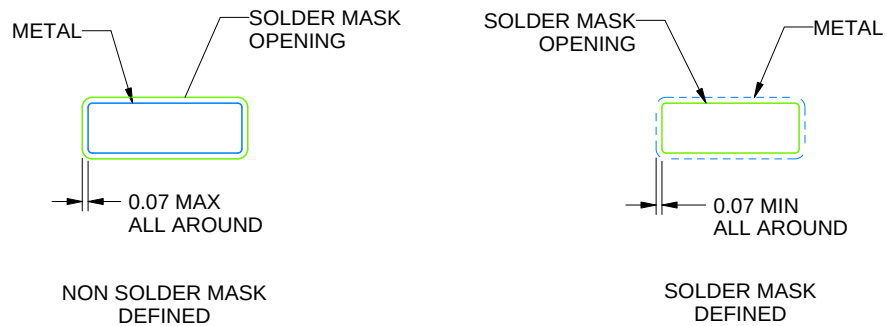
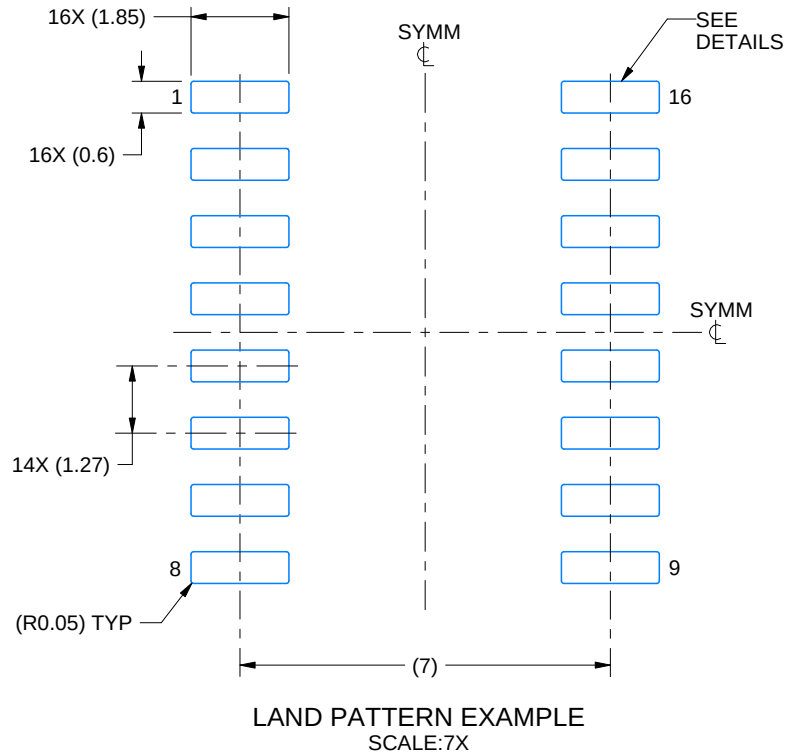
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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



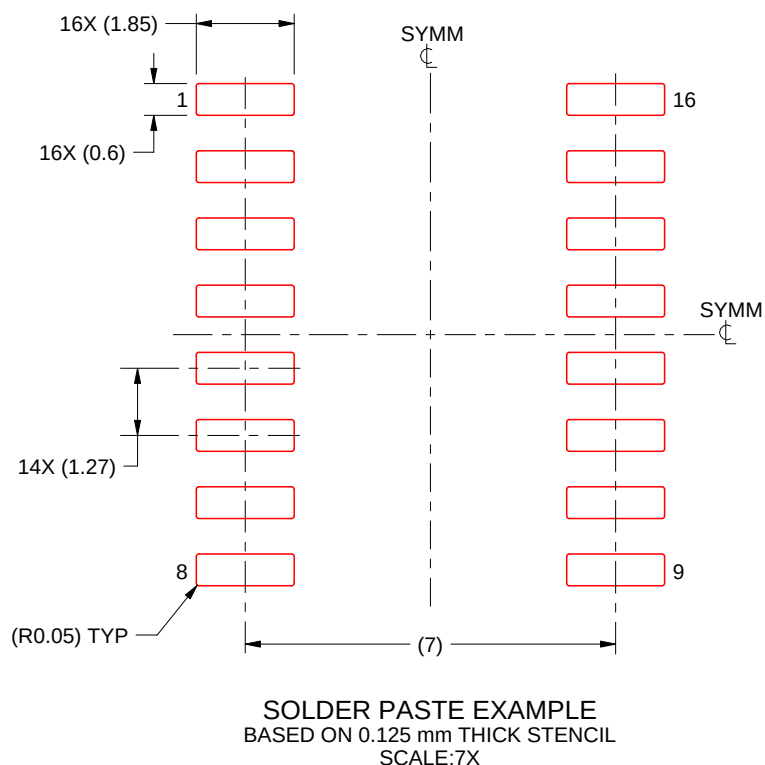
SOLDER MASK DETAILS

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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.



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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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