

SNx4HC174 具有清零功能的六路 D 类触发器

1 特性

- 2V 至 6V 的宽工作电压范围
- 输出可驱动多达 10 个 LSTTL 负载
- 低功耗， I_{CC} 最大值为 80 μ A
- t_{pd} 典型值 = 14ns
- 5V 时的输出驱动为 ± 4 mA
- 低输入电流，最大值 1 μ A
- 包含六个具有单轨的触发器

2 应用

- 缓冲/存储寄存器
- 移位寄存器
- 图形生成器

3 说明

SNx4HC174 包含六个具有共享时钟 (CLK) 和清零 ($\overline{CLR}$) 输入的正边沿触发式 D 型触发器。

器件信息

零件编号	封装 ⁽¹⁾	封装尺寸 (标称值)
SN74HC174D	SOIC (16)	9.90mm × 3.90mm
SN74HC174DB	SSOP (16)	6.20mm × 5.30mm
SN74HC174N	PDIP (16)	19.31mm × 6.35mm
SN74HC174NS	SO (16)	6.20mm × 5.30mm
SN74HC174PW	TSSOP (16)	5.00mm × 4.40mm
SN54HC174J	CDIP (16)	24.38mm × 6.92mm
SNJ54HC174FK	LCCC (20)	8.89mm × 8.45mm
SNJ54HC174W	CFP (16)	10.16mm × 6.73mm

(1) 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。

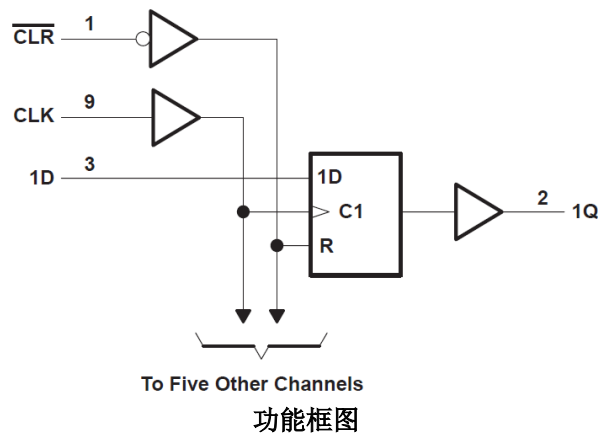


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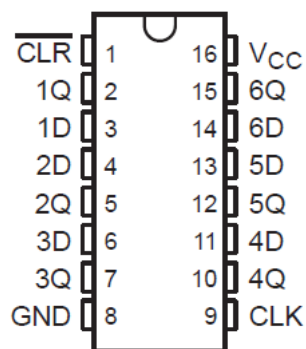
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4 Revision History

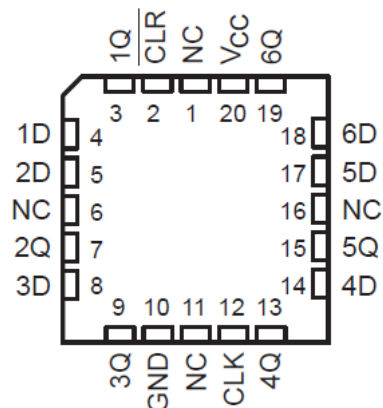
注：以前版本的页码可能与当前版本的页码不同

Changes from Revision D (September 2003) to Revision E (February 2022)	Page
• 更新了整个文档中的编号、格式、表格、图和交叉参考，以反映现代数据表标准.....	1

5 Pin Configuration and Functions



J, W, D, DB, N, NS, or PW Package
16-Pin CDIP, CFP, SOIC, SSOP, PDIP, SO, TSSOP
Top View



NC - No internal connection

FK Package
20-Pin LCCC
Top View

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
I_{IK}	Input clamp current ⁽²⁾	$V_I < 0$ or $V_I > V_{CC}$		± 20	mA
I_{OK}	Output clamp current ⁽²⁾	$V_O < 0$ or $V_O > V_{CC}$		± 20	mA
I_O	Continuous output current	$V_O = 0$ to V_{CC}		± 25	mA
	Continuous current through V_{CC} or GND			± 50	mA
T_J	Junction temperature			150	°C
T_{stg}	Storage temperature		- 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 [节 6.2](#) 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 Recommended Operating Conditions⁽¹⁾

			SN54HC174			SN74HC174			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		2	5	6	2	5	6	V
V_{IH}	High-level input voltage	$V_{CC} = 2$ V	1.5			1.5			V
		$V_{CC} = 4.5$ V	3.15			3.15			
		$V_{CC} = 6$ V	4.2			4.2			
V_{IL}	Low-level input voltage	$V_{CC} = 2$ V			0.5			0.5	V
		$V_{CC} = 4.5$ V			1.35			1.35	
		$V_{CC} = 6$ V			1.8			1.8	
V_I	Input voltage		0		V_{CC}	0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	0		V_{CC}	V
$\Delta t / \Delta v$	Input transition rise/fall time	$V_{CC} = 2$ V			1000			1000	ns
		$V_{CC} = 4.5$ V			500			500	
		$V_{CC} = 6$ V			400			400	
T_A	Operating free-air temperature		-55		125	-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](#).

6.3 Thermal Information

THERMAL METRIC		D (SOIC)	DB (SSOP)	N (PDIP)	NS (SO)	PW (TSSOP)	UNIT
		16 PINS	16 PINS	16 PINS	16 PINS	16 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽¹⁾	73	82	67	64	108	°C/W

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.

6.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS ⁽¹⁾	V _{CC} (V)	T _A = 25°C			SN54HC174		SN74HC174		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	I _{OH} = -20 μA	2	1.9	1.998		1.9		1.9		V
		4.5	4.4	4.499		4.4		4.4		
		6 V	5.9	5.999		5.9		5.9		
	I _{OH} = -4 mA	4.5	3.98	4.3		3.7		3.84		
	I _{OH} = -5.2 mA	6	5.48	5.8		5.2		5.34		
V _{OL}	I _{OL} = 20 μA	2		0.002	0.1		0.1		0.1	V
		4.5		0.001	0.1		0.1		0.1	
		6		0.001	0.1		0.1		0.1	
	I _{OL} = 4 mA	4.5		0.17	0.26		0.4		0.33	
	I _{OL} = 5.2 mA	6		0.15	0.26		0.4		0.33	
I _I	V _I = V _{CC} or 0	6		±0.1	±100		±1000		±1000	nA
I _{CC}	V _I = V _{CC} or 0, I _O = 0	6			8		160		80	μA
C _i		2 to 6		3	10		10		10	pF

(1) V_I = V_{IH} or V_{IL}, unless otherwise noted.

6.5 Timing Requirements

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

			V _{CC} (V)	T _A = 25°C		SN54HC174		SN74HC174		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency		2	6		4.2		5		MHz
			4.5	31		21		25		
			6	36		25		29		
t _w	Pulse duration	CLR low	2	80		120		100		ns
			4.5	16		24		20		
			6	14		20		17		
		CLK high or low	2	80		120		100		
			4.5	16		24		20		
			6	14		20		17		
t _{su}	Setup time before CLK-↑	Data	2	100		150		125		ns
			4.5	20		30		25		
			6	17		25		21		
		CLR inactive	2	100		150		125		
			4.5	20		30		25		
			6	17		25		21		
t _h	Hold time, data after CLK ↑		2	0		0		0		ns
			4.5	0		0		0		
			6	0		0		0		

6.6 Switching Characteristics

over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see [Section 7](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} (V)	$T_A = 25^\circ\text{C}$			SN54HC174		SN74HC174		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$f_{\max}$			2	6	9		4.2		5		MHz
			4.5	31	44		21		25		
			6	36	50		25		29		
t_{pd}	$\overline{\text{CLR}}$	Any	2		58	160		240		200	ns
			4.5		17	32		48		40	
			6		14	27		41		34	
	CLK	Any	2		58	160		240		200	
			4.5		17	32		48		40	
			6		14	27		41		34	
t_t		Any	2		38	75		110		90	ns
			4.5		8	15		22		19	
			6		6	13		19		16	

6.7 Operating Characteristics

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per flip-flop	No load	27	pF

7 Parameter Measurement Information

t_{pd} is the maximum between t_{PLH} and t_{PHL}

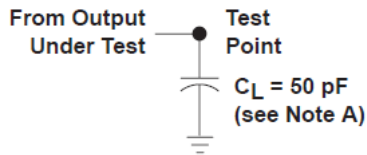


图 7-1. Load Circuit

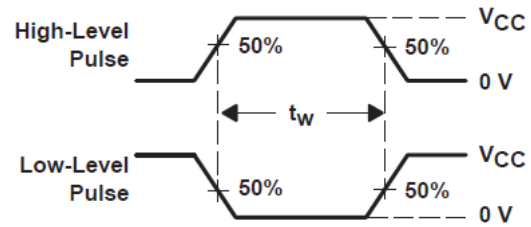


图 7-2. Voltage Waveforms
Pulse Durations

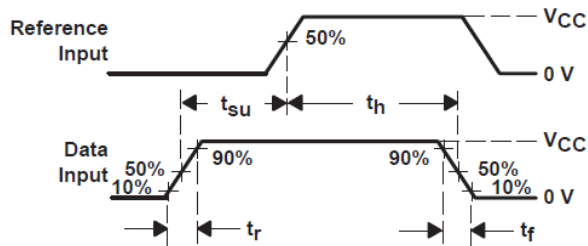


图 7-3. Voltage Waveforms
Setup and Hold and Input Rise and Fall Times

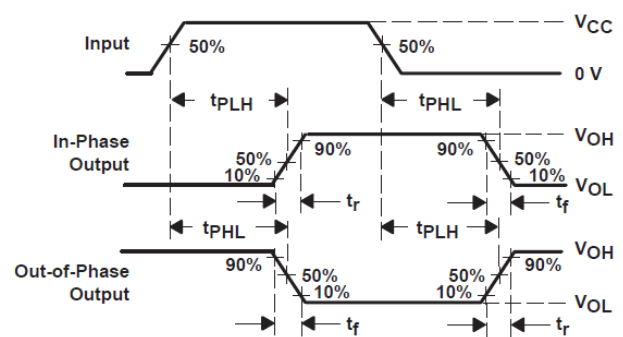


图 7-4. Voltage Waveforms
Propagation Delay and Output Transition Times

- A. C_L includes probe and jig capacitance.
- B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
- C. For clock inputs, f_{max} is measured when the input duty cycle is 50%
- D. The outputs are measured one at a time with one input transition per measurement.

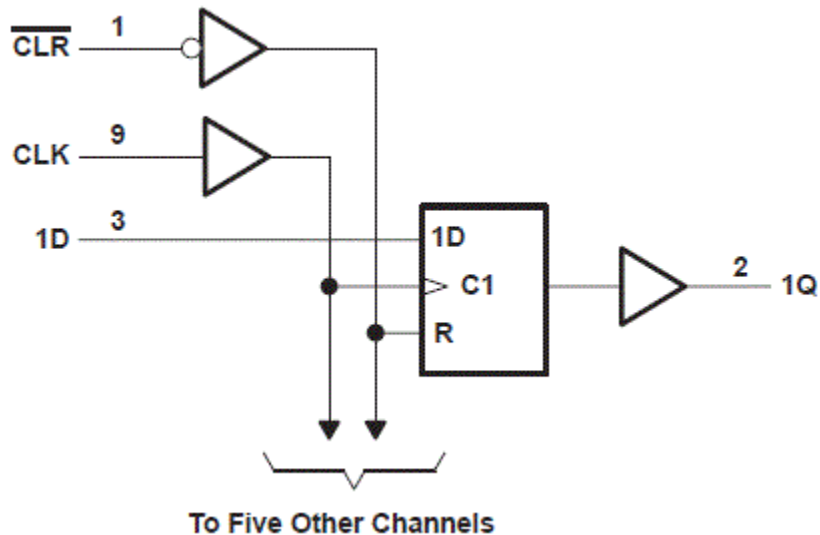
8 Detailed Description

8.1 Overview

These positive-edge-triggered D-type flip-flops have a direct clear ($\overline{\text{CLR}}$) input.

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



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

8.3 Device Functional Modes

表 8-1. Function Table
(each flip-flop)

INPUTS			OUTPUT Q
CLR	CLK	D	
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q ₀

9 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each V_{CC} terminal should have a good bypass capacitor to prevent power disturbance. A 0.1- μ F capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- μ F and 1- μ F capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

10 Layout

10.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or V_{CC} , whichever makes more sense for the logic function or is more convenient.

11 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

11.1 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 [订阅更新](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

11.2 支持资源

[TI E2E™ 支持论坛](#) 是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

11.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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11.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

11.5 术语表

[TI 术语表](#) 本术语表列出并解释了术语、首字母缩略词和定义。

12 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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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)
84073012A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84073012A SNJ54HC 174FK
8407301EA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301EA SNJ54HC174J
8407301FA	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301FA SNJ54HC174W
JM38510/65307BEA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65307BEA
JM38510/65307BEA.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65307BEA
M38510/65307BEA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 65307BEA
SN54HC174J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC174J
SN54HC174J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54HC174J
SN74HC174D	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	-40 to 85	HC174
SN74HC174DBR	Active	Production	SSOP (DB) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174DBR.A	Active	Production	SSOP (DB) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174DR	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174DR.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174DRG4	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174DRG4.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC174N
SN74HC174N.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC174N
SN74HC174NE4	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74HC174N
SN74HC174NSR	Active	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174NSR.A	Active	Production	SOP (NS) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174PW	Obsolete	Production	TSSOP (PW) 16	-	-	Call TI	Call TI	-40 to 85	HC174
SN74HC174PWR	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174PWR.A	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SN74HC174PWRG4	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174

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)
SN74HC174PWRG4.A	Active	Production	TSSOP (PW) 16	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC174
SNJ54HC174FK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84073012A SNJ54HC 174FK
SNJ54HC174FK.A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	84073012A SNJ54HC 174FK
SNJ54HC174J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301EA SNJ54HC174J
SNJ54HC174J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301EA SNJ54HC174J
SNJ54HC174W	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301FA SNJ54HC174W
SNJ54HC174W.A	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	8407301FA SNJ54HC174W

⁽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.

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OTHER QUALIFIED VERSIONS OF SN54HC174, SN74HC174 :

- Catalog : [SN74HC174](#)
- Military : [SN54HC174](#)

NOTE: Qualified Version Definitions:

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

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
SN74HC174DBR	SSOP	DB	16	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74HC174DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC174DRG4	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC174NSR	SOP	NS	16	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
SN74HC174PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC174PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC174PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC174PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.3	1.6	8.0	12.0	Q1
SN74HC174PWRG4	TSSOP	PW	16	2000	330.0	12.4	6.9	5.3	1.6	8.0	12.0	Q1
SN74HC174PWRG4	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

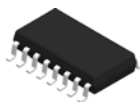
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC174DBR	SSOP	DB	16	2000	353.0	353.0	32.0
SN74HC174DR	SOIC	D	16	2500	353.0	353.0	32.0
SN74HC174DRG4	SOIC	D	16	2500	353.0	353.0	32.0
SN74HC174NSR	SOP	NS	16	2000	353.0	353.0	32.0
SN74HC174PWR	TSSOP	PW	16	2000	353.0	353.0	32.0
SN74HC174PWR	TSSOP	PW	16	2000	353.0	353.0	32.0
SN74HC174PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
SN74HC174PWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74HC174PWRG4	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74HC174PWRG4	TSSOP	PW	16	2000	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)
84073012A	FK	LCCC	20	55	506.98	12.06	2030	NA
8407301FA	W	CFP	16	25	506.98	26.16	6220	NA
SN74HC174N	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC174N	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC174N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC174N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC174NE4	N	PDIP	16	25	506	13.97	11230	4.32
SN74HC174NE4	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54HC174FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC174FK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54HC174W	W	CFP	16	25	506.98	26.16	6220	NA
SNJ54HC174W.A	W	CFP	16	25	506.98	26.16	6220	NA

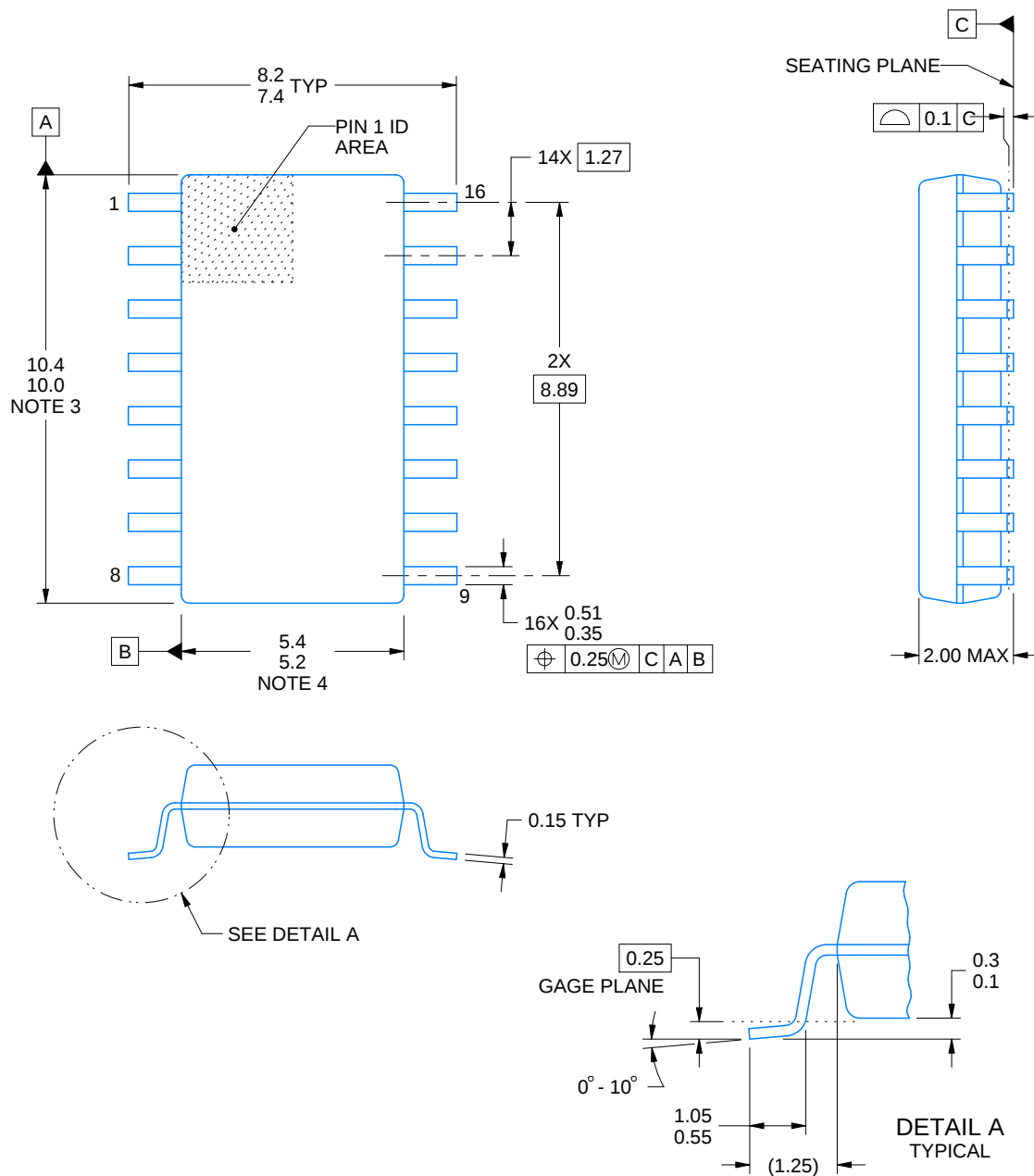


PACKAGE OUTLINE

NS0016A

SOP - 2.00 mm max height

SOP



4220735/A 12/2021

NOTES:

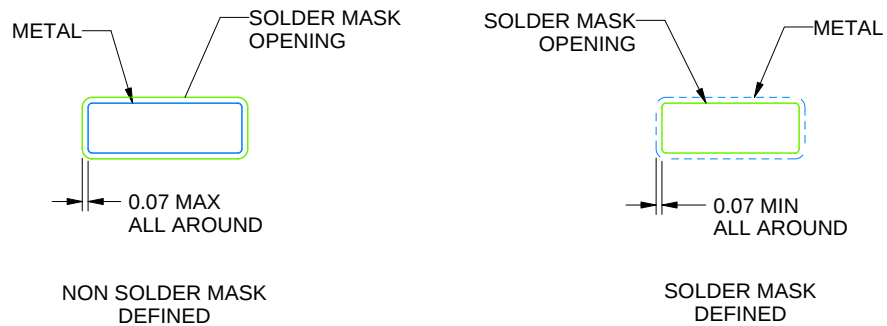
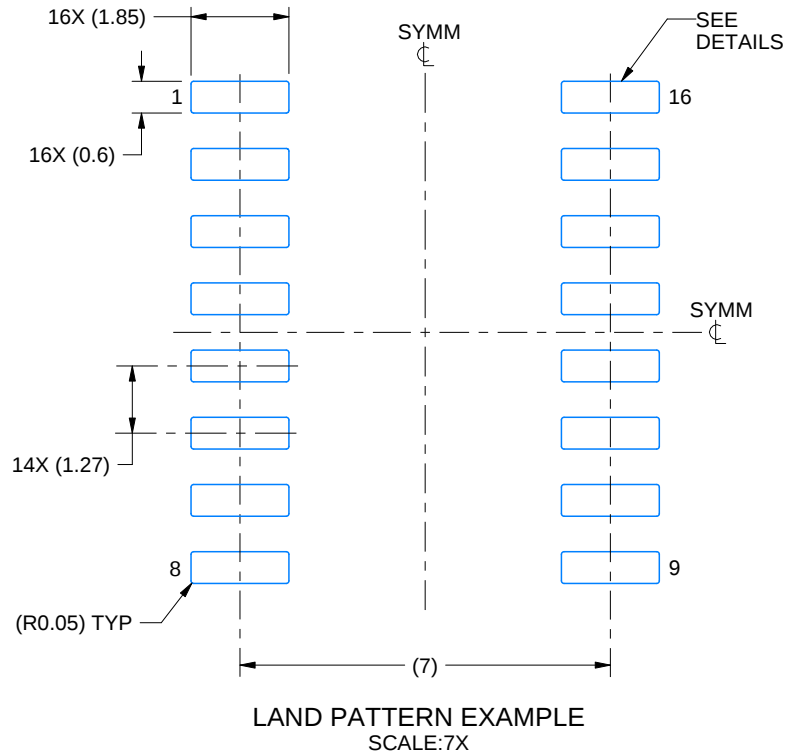
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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



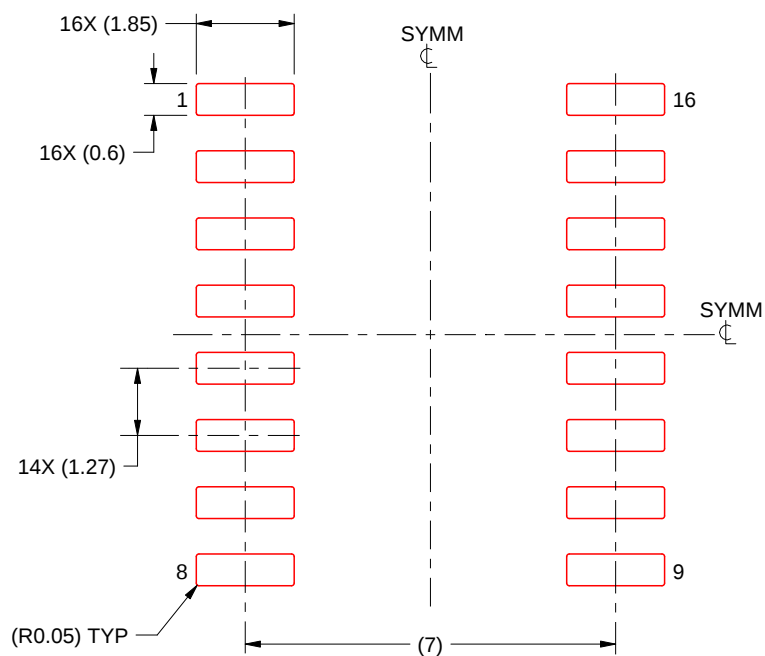
SOLDER MASK DETAILS

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.



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

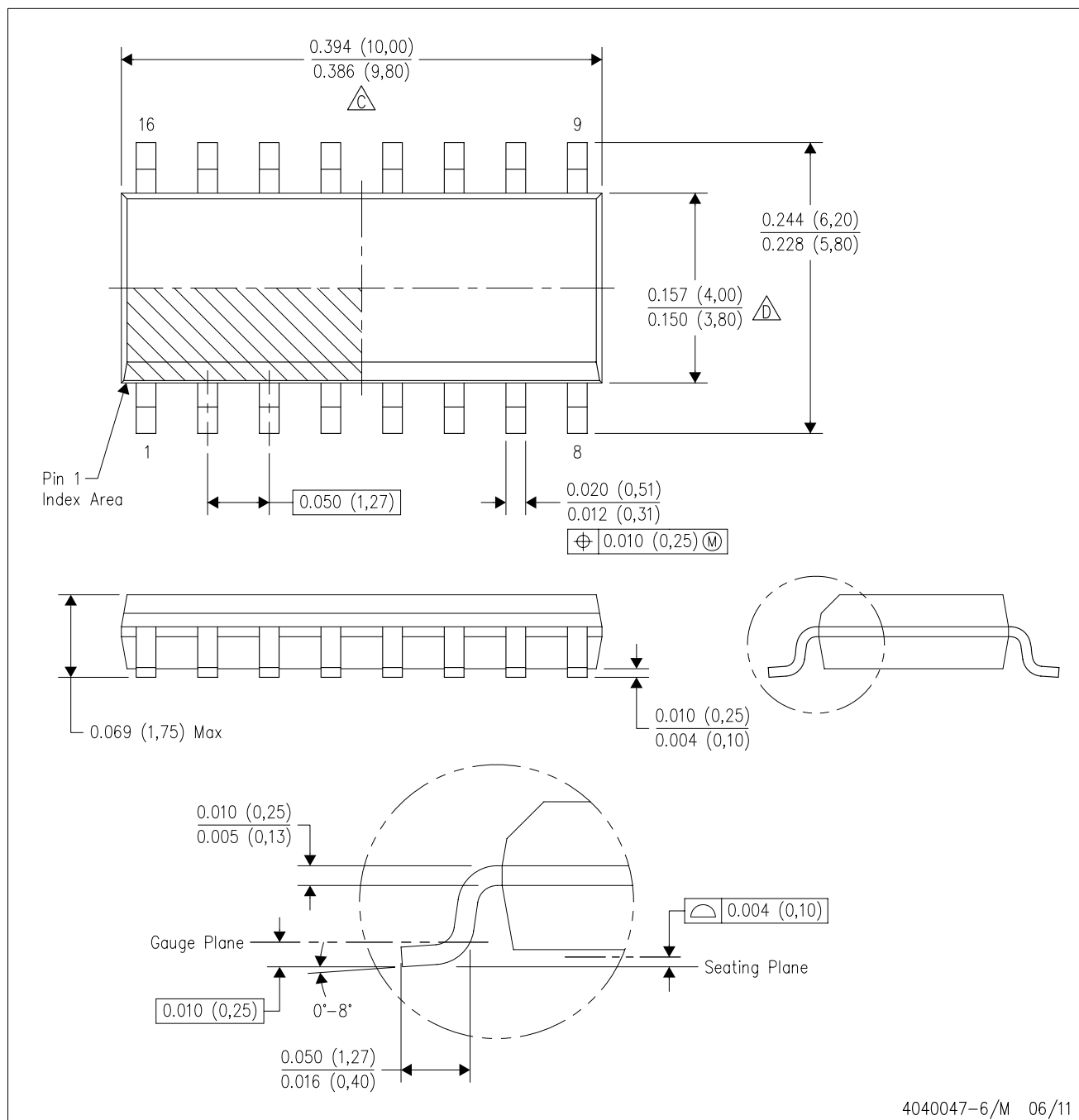
4220735/A 12/2021

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.

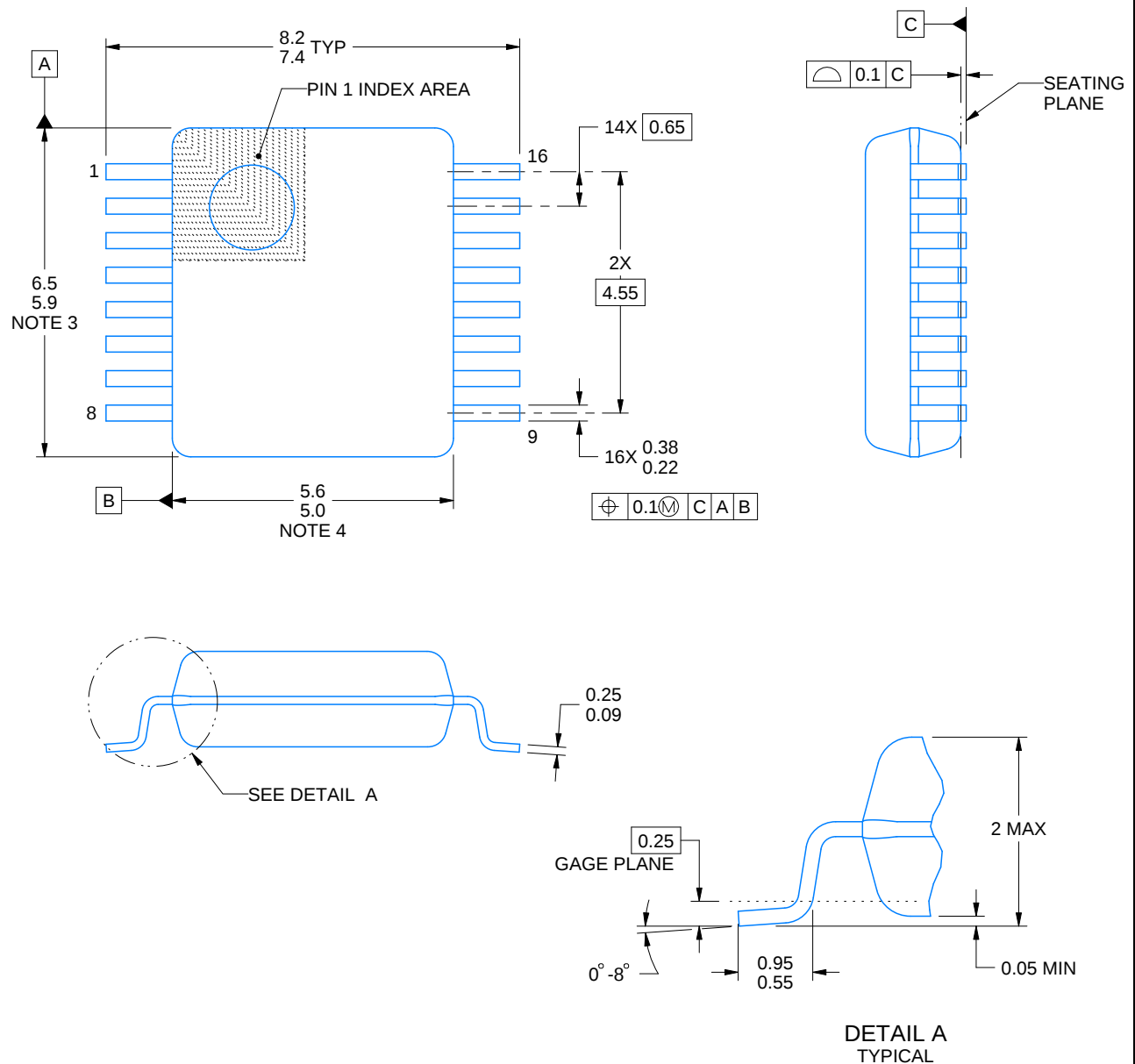
D (R-PDSO-G16)

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.



4220763/A 05/2022

NOTES:

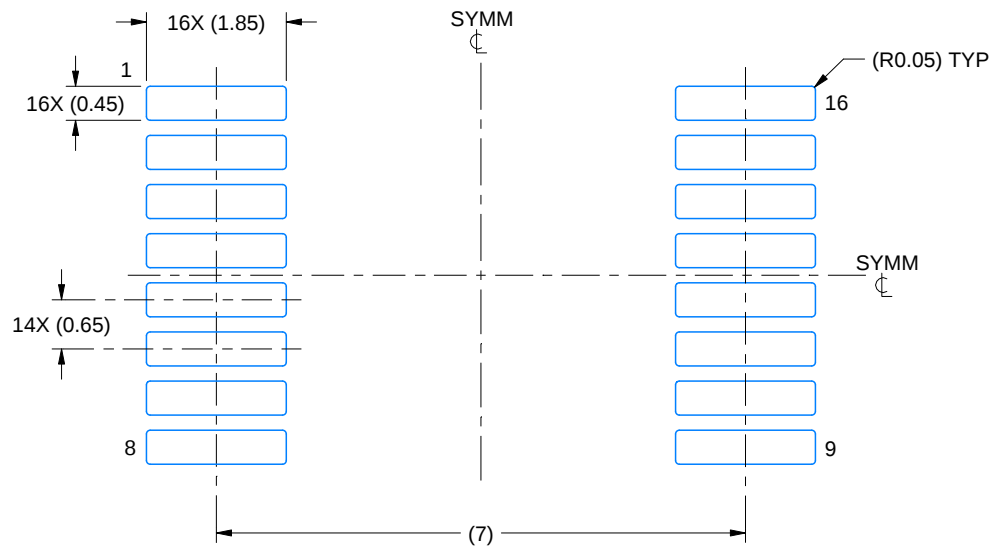
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

EXAMPLE BOARD LAYOUT

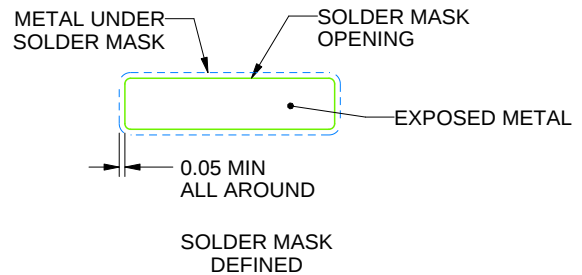
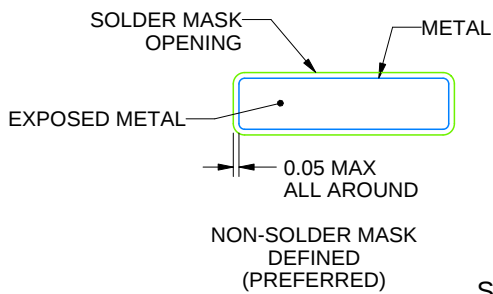
DB0016A

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.

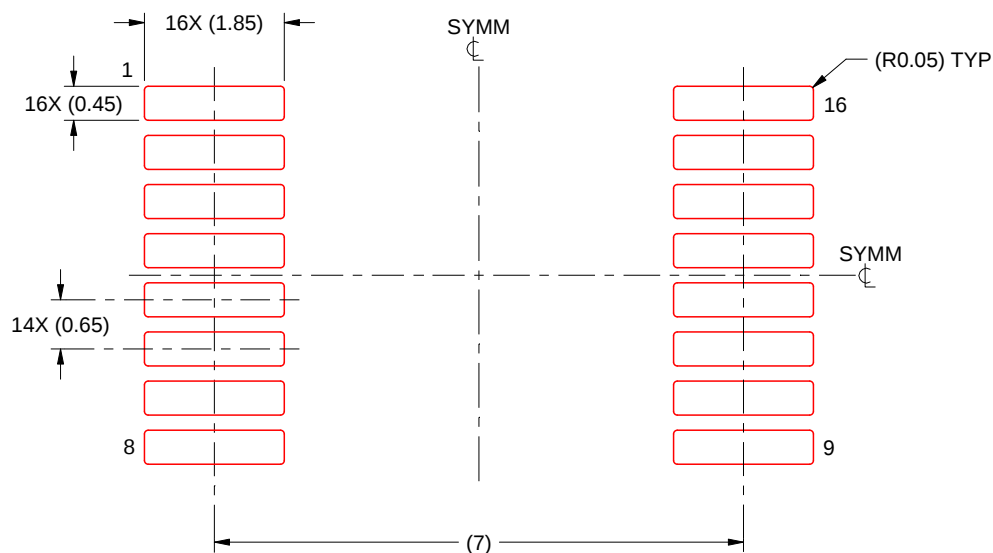
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0016A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

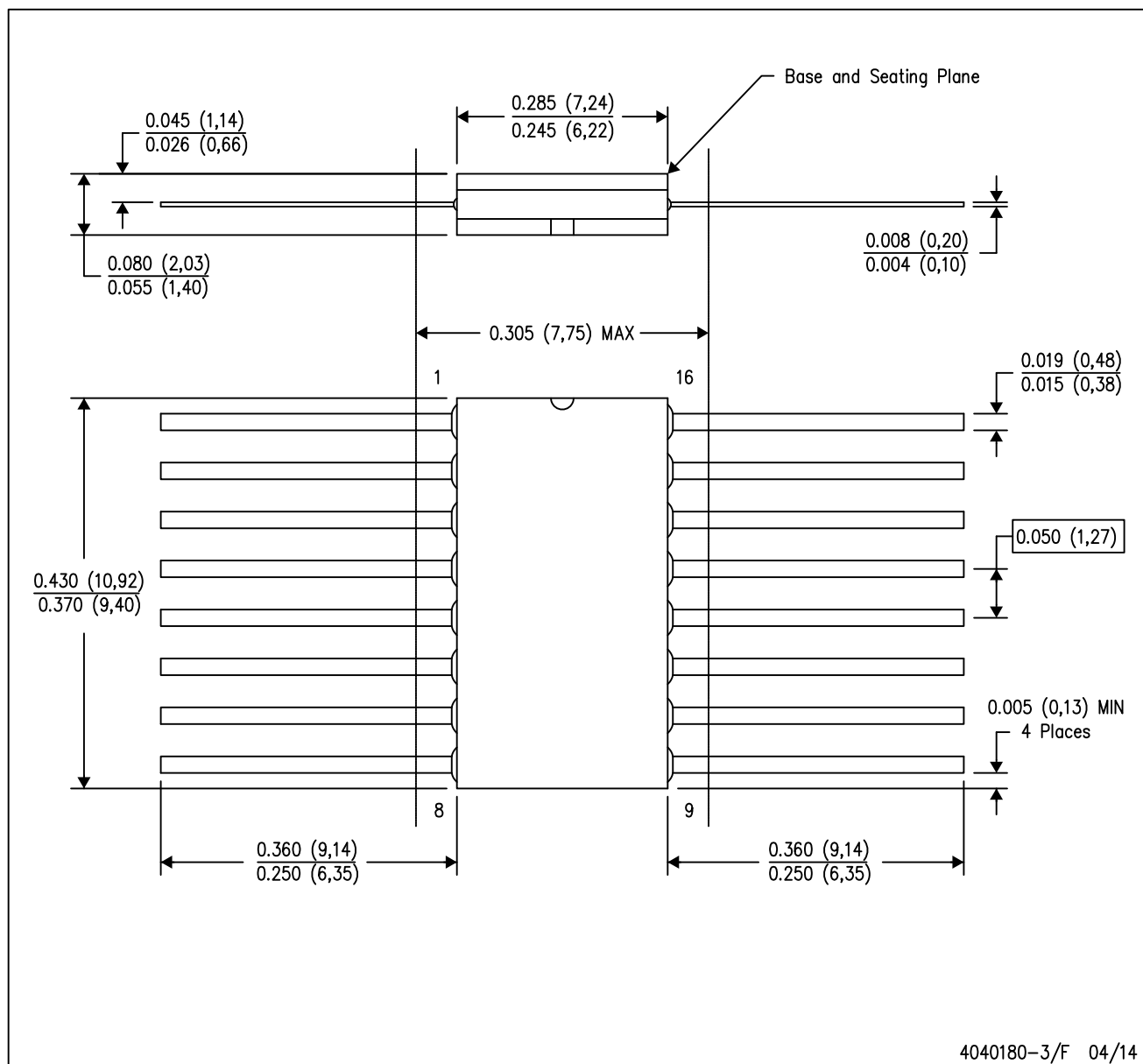
4220763/A 05/2022

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.

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

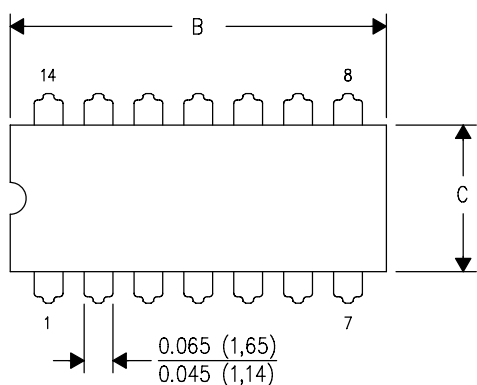


4229370VA\

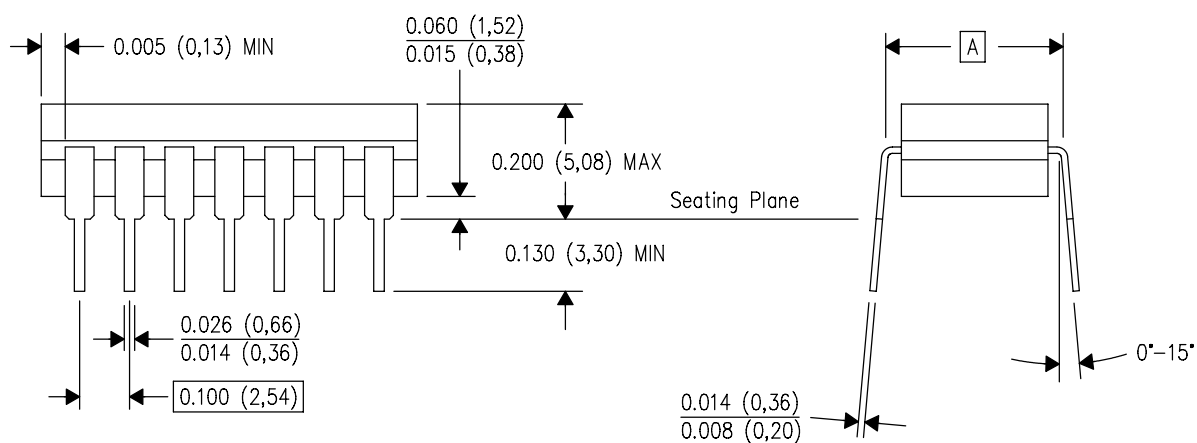
J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	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

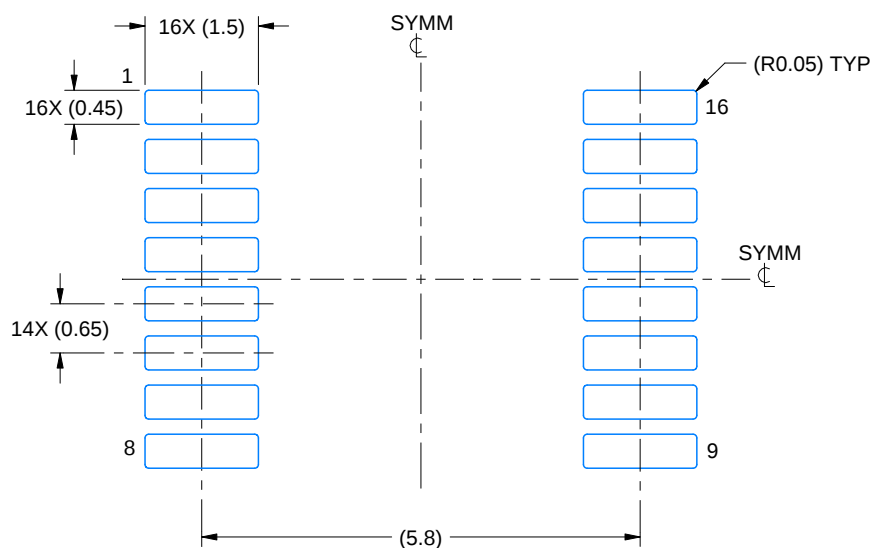
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal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

EXAMPLE BOARD LAYOUT

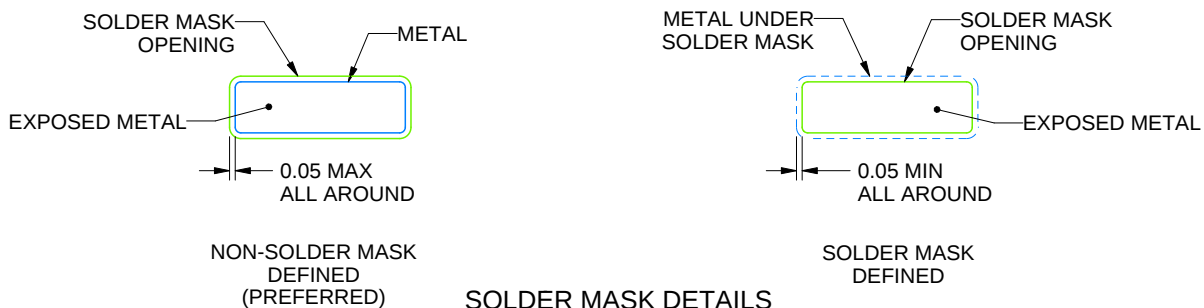
PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220204/B 12/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

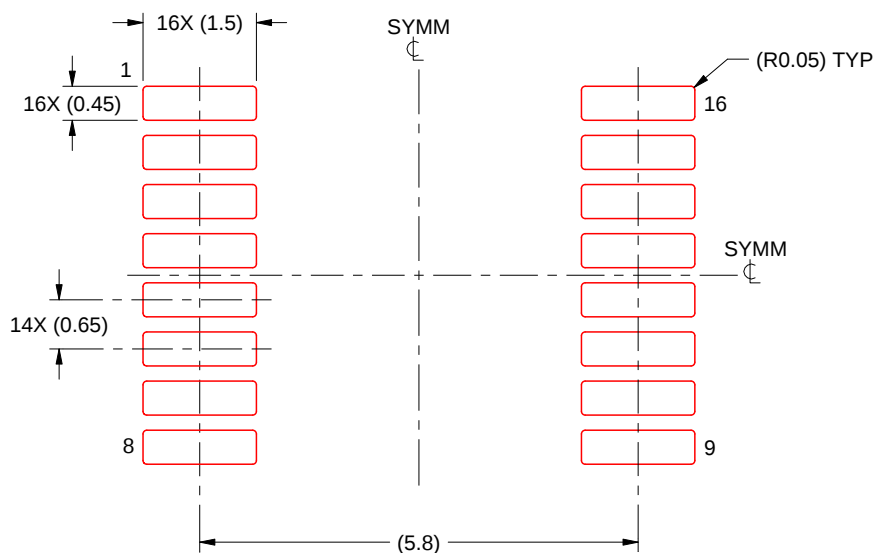
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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/B 12/2023

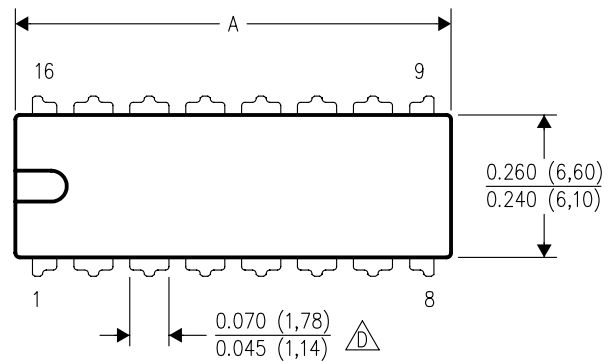
NOTES: (continued)

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.

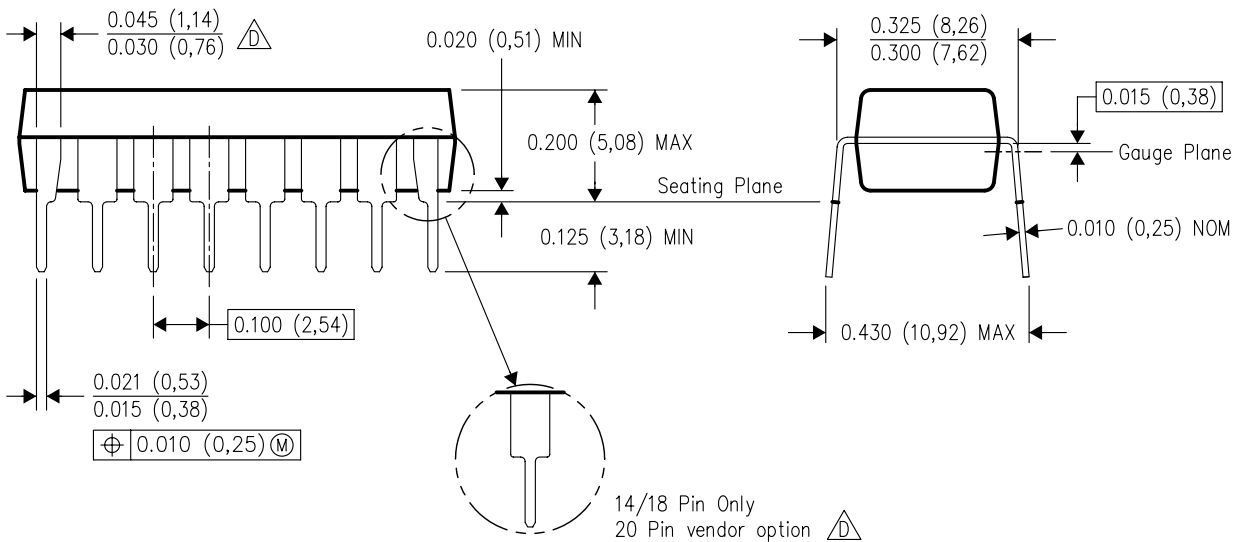
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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