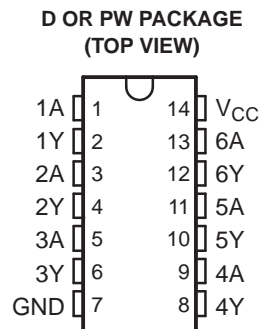


FEATURES

- **Controlled Baseline**
 - One Assembly/Test Site, One Fabrication Site
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree ⁽¹⁾**
- **Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$**
- **Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$**
- **Supports Mixed-Mode Voltage Operation on All Ports**
- **I_{off} Supports Partial-Power-Down Mode Operation**
- **ESD Protection Exceeds JESD 22**
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)



- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

DESCRIPTION/ORDERING INFORMATION

This hex Schmitt-trigger inverter is designed for 2-V to 5.5-V V_{CC} operation.

The SN74LV14A contains six independent inverters. This device performs the Boolean function $Y = \bar{A}$.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

ORDERING INFORMATION

T_A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 105°C	TSSOP – PW	Tape and reel	SN74LV14ATPWREP	LV14AEP
–55°C to 125°C	SOIC – D	Tape and reel	SN74LV14AMDREP	LV14AEP
	TSSOP – PW	Tape and reel	SN74LV14AMPWREP	LV14AEP

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

FUNCTION TABLE (each inverter)

INPUT A	OUTPUT Y
H	L
L	H

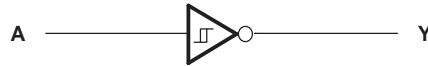


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

SN74LV14A-EP HEX SCHMITT-TRIGGER INVERTER

SCLS499C – MAY 2003 – REVISED JUNE 2006

LOGIC DIAGRAM, EACH INVERTER (POSITIVE LOGIC)



Absolute Maximum Ratings⁽¹⁾

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

		MIN	MAX	UNIT
V_{CC}	Supply voltage range	-0.5	7	V
V_I	Input voltage range ⁽²⁾	-0.5	7	V
V_O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	-0.5	7	V
V_O	Output voltage range ⁽²⁾⁽³⁾	-0.5	$V_{CC} + 0.5$	V
I_{IK}	Input clamp current		-20	mA
		$V_I < 0$		
I_{OK}	Output clamp current		-50	mA
		$V_O < 0$		
I_O	Continuous output current		± 25	mA
		$V_O = 0$ to V_{CC}		
	Continuous current through V_{CC} or GND		± 50	mA
θ_{JA}	Thermal impedance ⁽⁴⁾	D package	133.5	°C/W
		PW package	113	
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 negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) This value is limited to 5.5 V maximum.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions⁽¹⁾

		MIN	MAX	UNIT	
V _{CC}	Supply voltage	2	5.5	V	
V _{IH}	High-level input voltage	V _{CC} = 2 V	1.5	V	
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.7		
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.7		
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.7		
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0.5	V	
		V _{CC} = 2.3 V to 2.7 V	V _{CC} × 0.3		
		V _{CC} = 3 V to 3.6 V	V _{CC} × 0.3		
		V _{CC} = 4.5 V to 5.5 V	V _{CC} × 0.3		
V _I	Input voltage	0	5.5	V	
V _O	Output voltage	0	V _{CC}	V	
I _{OH}	High-level output current	V _{CC} = 2 V	–50	μA	
		V _{CC} = 2.3 V to 2.7 V	–2	mA	
		V _{CC} = 3 V to 3.6 V	–6		
		V _{CC} = 4.5 V to 5.5 V	–12		
I _{OL}	Low-level output current	V _{CC} = 2 V	50		μA
		V _{CC} = 2.3 V to 2.7 V	2	mA	
		V _{CC} = 3 V to 3.6 V	6		
		V _{CC} = 4.5 V to 5.5 V	12		
T _A	Operating free-air temperature	SN74LV14AT	–40		105
		SN74LV14AM	–55	125	

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN74LV14A-EP HEX SCHMITT-TRIGGER INVERTER

SCLS499C – MAY 2003 – REVISED JUNE 2006

Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	SN74LV14AT			SN74LV14AM			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V _{T+} Positive-going threshold		2.5 V			1.75			1.78	V
		3.3 V			2.31			2.31	
		5 V			3.5			3.5	
V _{T-} Negative-going threshold		2.5 V	0.75			0.75			V
		3.3 V	0.99			0.97			
		5 V	1.5			1.5			
ΔV _T Hysteresis (V _{T+} – V _{T-})		2.5 V	0.25		1	0.25		1	V
		3.3 V	0.33		1.32	0.33		1.37	
		5 V	0.5		2	0.5		2	
V _{OH}	I _{OH} = –50 μA	2 V to 5.5 V	V _{CC} – 0.1			V _{CC} – 0.1			V
	I _{OH} = –2 mA	2.3 V	2			2			
	I _{OH} = –6 mA	3 V	2.48			2.48			
	I _{OH} = –12 mA	4.5 V	3.8			3.8			
V _{OL}	I _{OL} = 50 μA	2 V to 5.5 V				0.1			V
	I _{OL} = 2 mA	2.3 V				0.4			
	I _{OL} = 6 mA	3 V				0.44			
	I _{OL} = 12 mA	4.5 V				0.55			
I _I	V _I = V _{CC} or GND	0 to 5.5 V				±1			μA
I _{CC}	V _I = V _{CC} or GND, I _O = 0	5.5 V				20			μA
I _{off}	V _I or V _O = 0 to 5.5 V	0 V				5			μA
C _i	V _I = V _{CC} or GND	3.3 V	2.3			2.3			pf
		5 V	2.3			2.3			

Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see [Figure 1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t _{pd}	A	Y	C _L = 50 pF	9.6	16.3		1	20.4	ns

Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t _{pd}	A	Y	C _L = 50 pF	6.7	10.6		1	14	ns

Noise Characteristics⁽¹⁾

$V_{CC} = 3.3\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.2	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}	-0.1	-0.8		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		3.1		V
$V_{IH(D)}$	High-level dynamic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

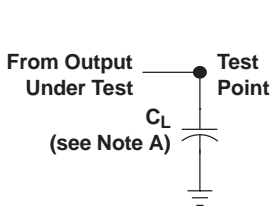
(1) Characteristics are for surface-mount packages only.

Operating Characteristics

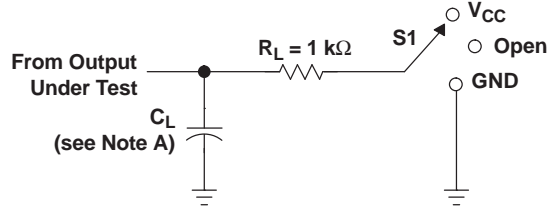
$T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd}	Power dissipation capacitance	$C_L = 50\text{ pF}$, $f = 10\text{ MHz}$	3.3 V	8.8	pF
			5 V	9.6	

PARAMETER MEASUREMENT INFORMATION

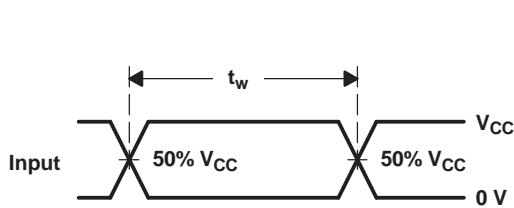


LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

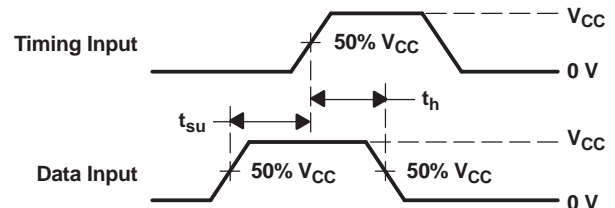


LOAD CIRCUIT FOR
3-STATE AND OPEN-DRAIN OUTPUTS

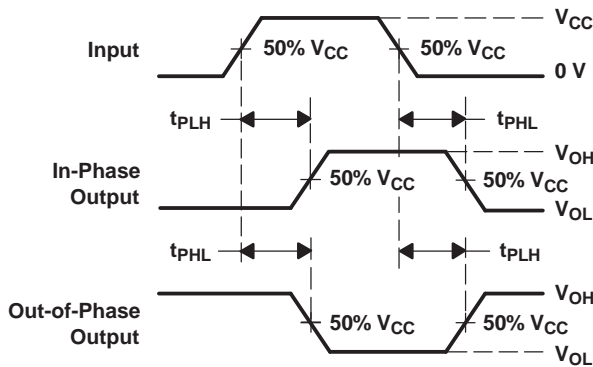
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND
Open Drain	V_{CC}



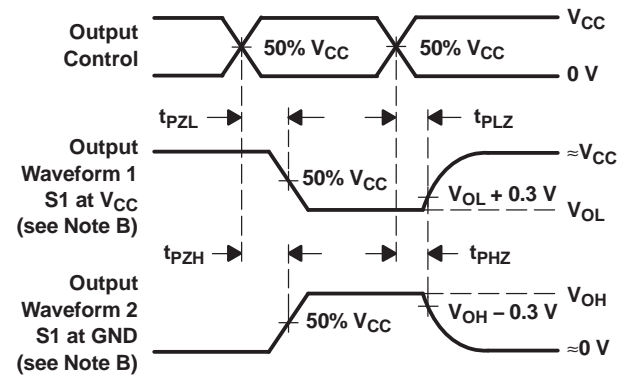
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

- NOTES: 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.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PHL} and t_{PLH} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuits 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)
SN74LV14AMDREP	NRND	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	LV14AMEP
SN74LV14AMDREP.A	NRND	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	LV14AMEP
SN74LV14AMPWREP	Obsolete	Production	TSSOP (PW) 14	-	-	Call TI	Call TI	-55 to 125	LV14AEP
SN74LV14ATPWREP	Active	Production	TSSOP (PW) 14	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 105	LV14AEP
SN74LV14ATPWREP.A	Active	Production	TSSOP (PW) 14	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 105	LV14AEP
V62/03662-01XE	Active	Production	TSSOP (PW) 14	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 105	LV14AEP
V62/03662-02YE	NRND	Production	SOIC (D) 14	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	LV14AMEP

(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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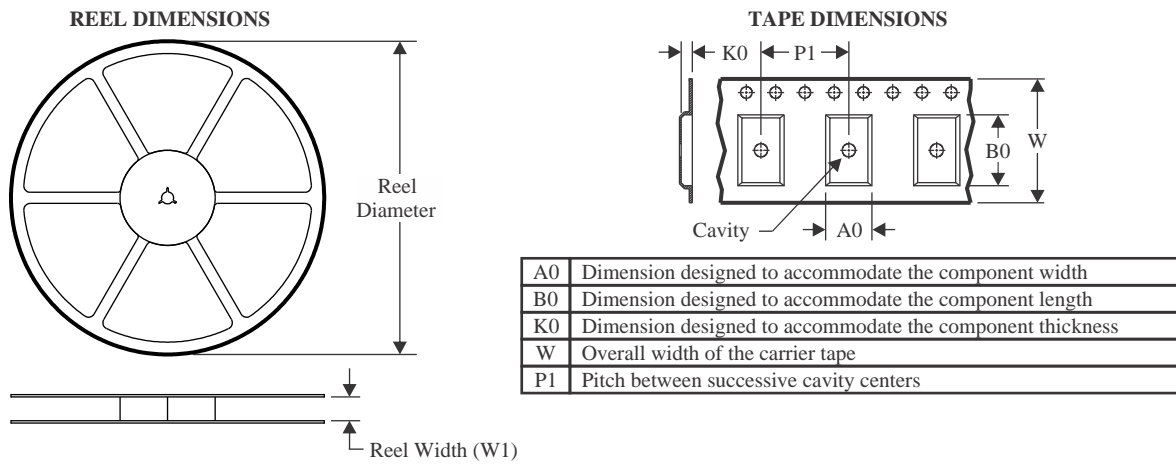
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OTHER QUALIFIED VERSIONS OF SN74LV14A-EP :

- Catalog : [SN74LV14A](#)
- Automotive : [SN74LV14A-Q1](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

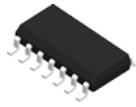

*All dimensions are nominal

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
SN74LV14AMDREP	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74LV14ATPWREP	TSSOP	PW	14	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)
SN74LV14AMDREP	SOIC	D	14	2500	353.0	353.0	32.0
SN74LV14ATPWREP	TSSOP	PW	14	2000	353.0	353.0	32.0

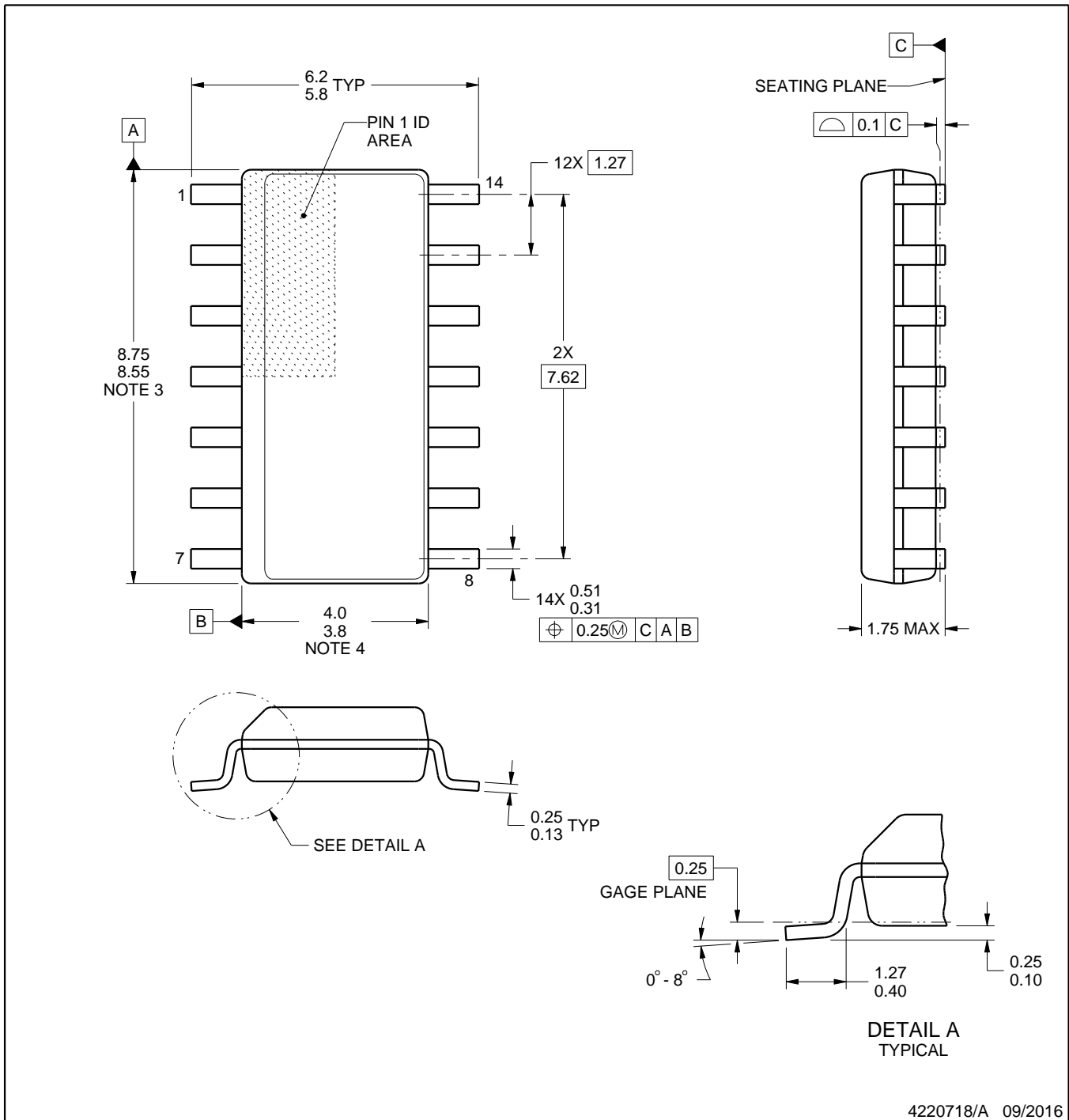


D0014A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

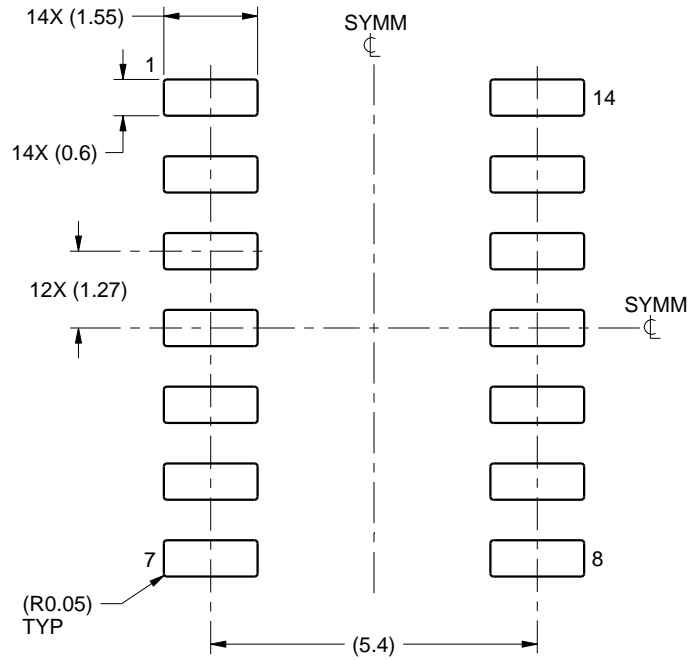
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

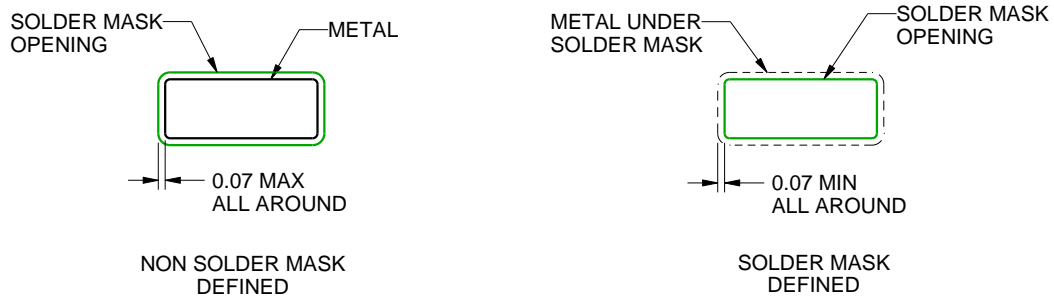
D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

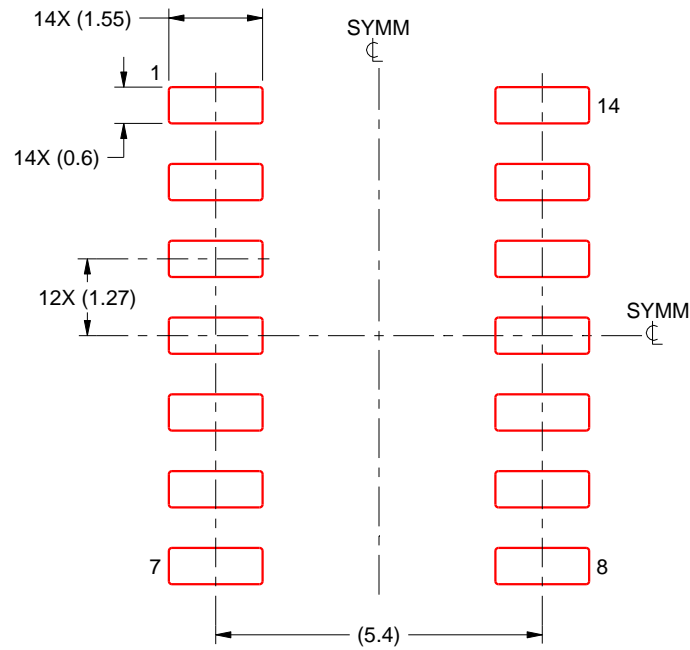
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

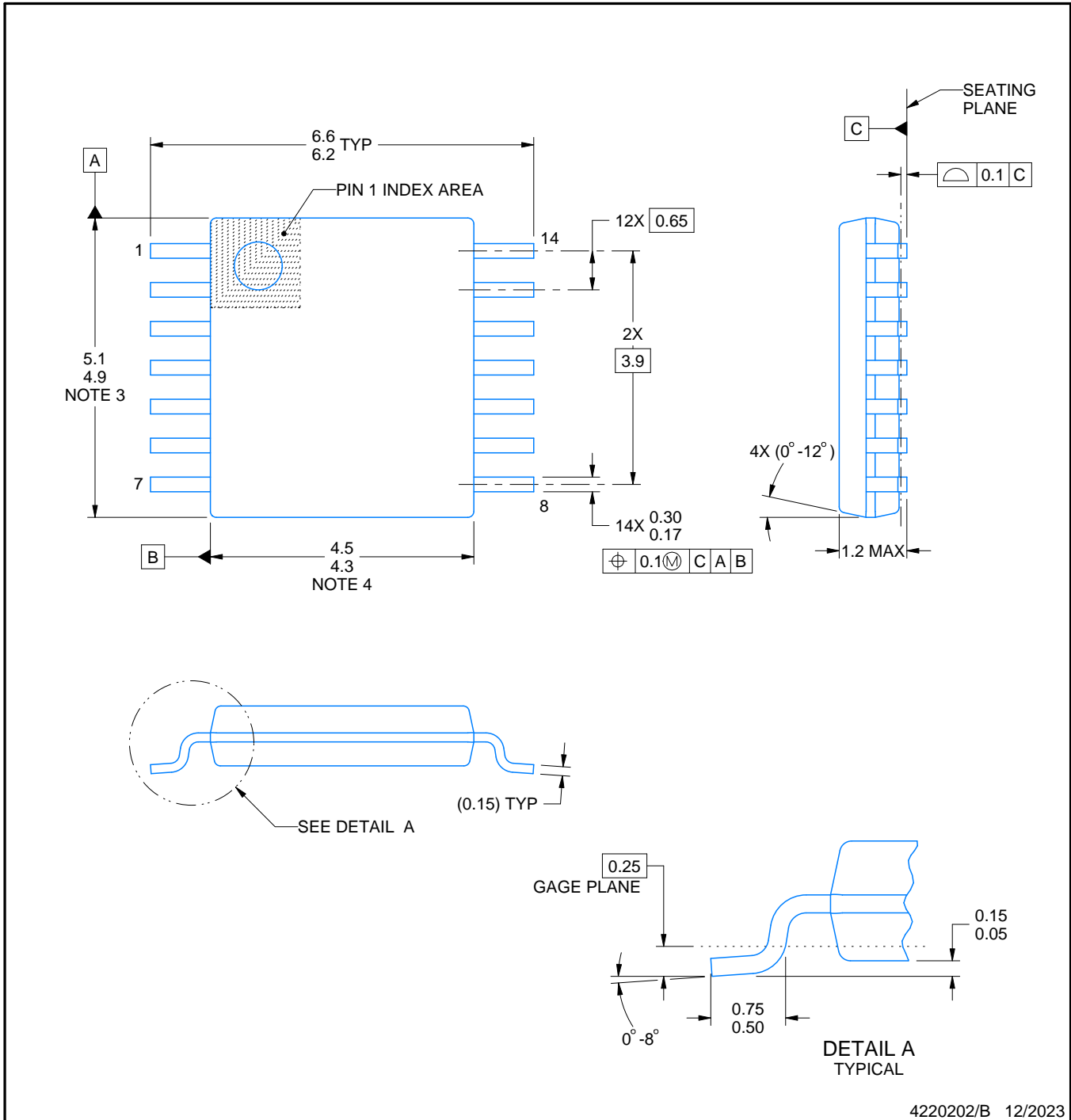
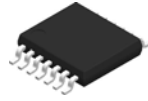


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

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.



4220202/B 12/2023

NOTES:

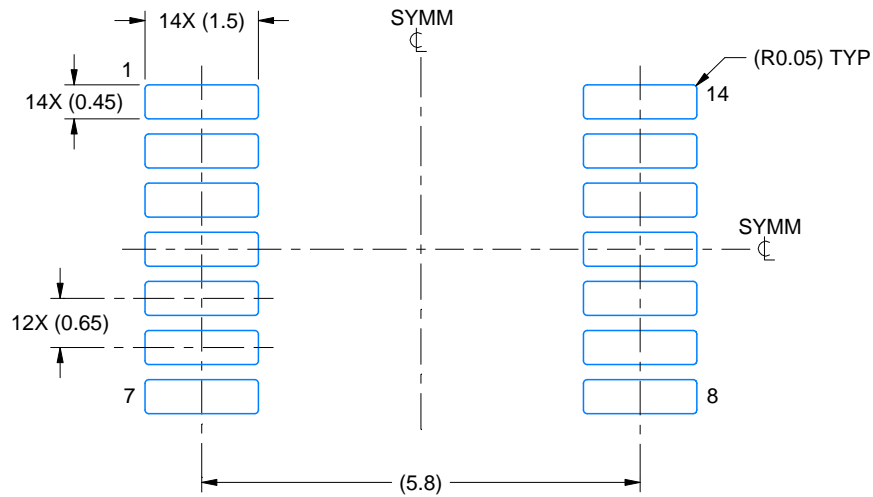
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

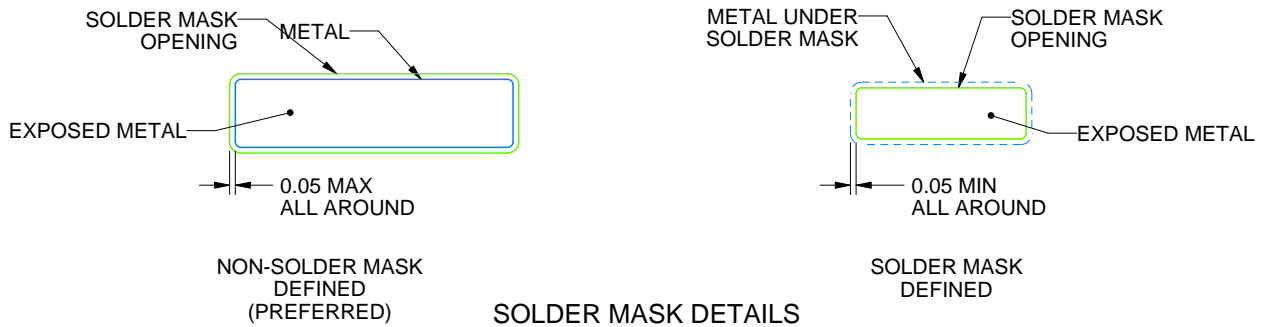
PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220202/B 12/2023

NOTES: (continued)

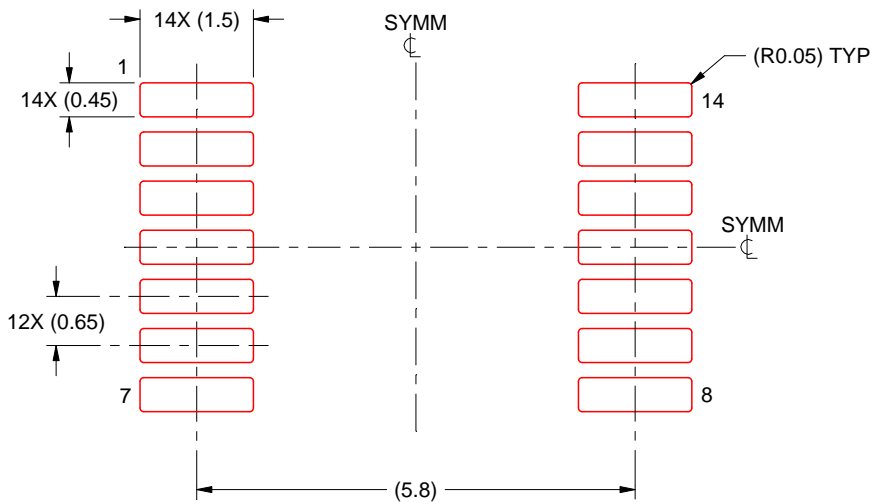
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220202/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.

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