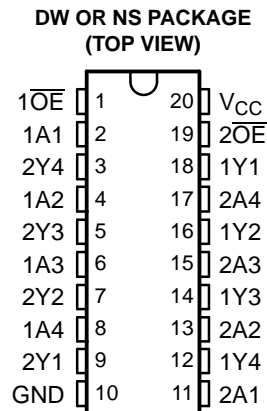


## FEATURES

- Controlled Baseline
  - One Assembly/Test Site, One Fabrication Site
- Extended Temperature Performance of up to  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
- Enhanced Diminishing Manufacturing Sources (DMS) Support
- Enhanced Product-Change Notification
- Qualification Pedigree <sup>(1)</sup>
- 4.5-V to 5.5-V  $V_{\text{CC}}$  Operation
- Inputs Accept Voltages to 5.5 V
- Max  $t_{\text{pd}}$  of 9.5 ns at 5 V
- Inputs Are TTL Compatible

(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

The SN74ACT244-EP octal buffer/driver is designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

The device is organized as two 4-bit buffers/drivers with separate output-enable ( $\overline{\text{OE}}$ ) inputs. When  $\overline{\text{OE}}$  is low, the device passes noninverted data from the A inputs to the Y outputs. When  $\overline{\text{OE}}$  is high, the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{\text{OE}}$  should be tied to  $V_{\text{CC}}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

## ORDERING INFORMATION

$T_{\text{A}}$	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$	SOIC – DW	Tape and reel	SN74ACT244MDWREP	SACT244MEP
	SOP – NS	Tape and reel	SN74ACT244MNSREP	SACT244MEP
$-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	SOIC – DW	Tape and reel	SN74ACT244IDWREP	SACT244IEP

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

## FUNCTION TABLE (EACH BUFFER)

INPUTS		OUTPUT Y
$\overline{\text{OE}}$	A	
L	H	H
L	L	L
H	X	Z

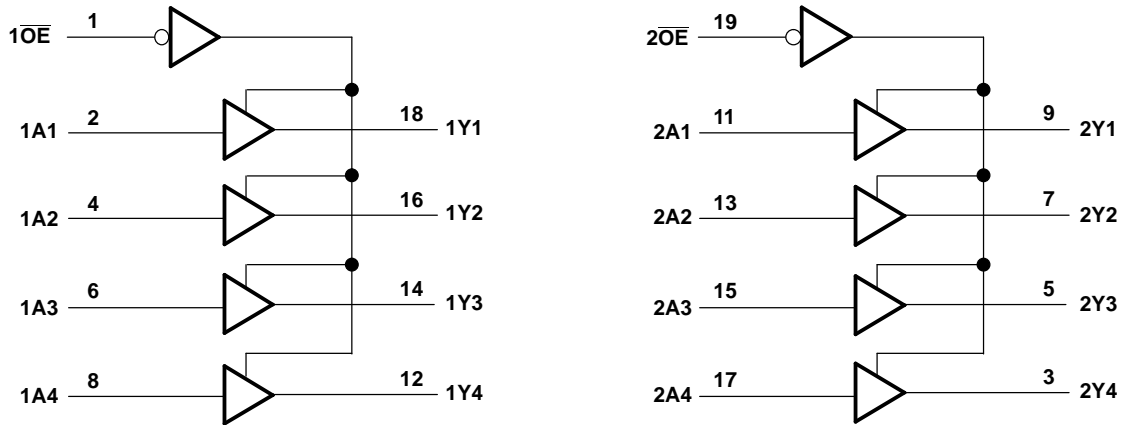


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# SN74ACT244-EP OCTAL BUFFER/DRIVER WITH 3-STATE OUTPUTS

SCAS724B—OCTOBER 2003—REVISED MARCH 2006

## LOGIC DIAGRAM (POSITIVE LOGIC)



## Absolute Maximum Ratings<sup>(1)</sup>

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 <sup>(2)</sup>	-0.5	$V_{CC} + 0.5$	V
$V_O$	Output voltage range <sup>(2)</sup>	-0.5	$V_{CC} + 0.5$	V
$I_{IK}$	Input clamp current	$V_I < 0$ or $V_I > V_{CC}$		$\pm 20$ mA
$I_{OK}$	Output clamp current	$V_O < 0$ or $V_O > V_{CC}$		$\pm 20$ mA
$I_O$	Continuous output current	$V_O = 0$ to $V_{CC}$		$\pm 50$ mA
Continuous current through $V_{CC}$ or GND				$\pm 200$ mA
$\theta_{JA}$	Package thermal impedance <sup>(3)</sup>	DW package		58
		NS package		60
$T_{stg}$	Storage temperature range <sup>(4)</sup>	-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.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.
- (4) Long-term high-temperature storage and/or extended use at maximum recommended operating conditions may result in a reduction of overall device life. See [http://www.ti.com/ep\\_quality](http://www.ti.com/ep_quality) for additional information on enhanced plastic packaging.

## Recommended Operating Conditions<sup>(1)</sup>

		MIN	MAX	UNIT
$V_{CC}$	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	$V_{CC}$	V
$V_O$	Output voltage	0	$V_{CC}$	V
$I_{OH}$	High-level output current		-24	mA
$I_{OL}$	Low-level output current		24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		8	ns/V
$T_A$	Operating free-air temperature	SN74ACT244M-EP		-55 to 125
		SN74ACT244I-EP		-40 to 85

- (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.

## Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN74ACT244M-EP		SN74ACT244I-EP		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	4.5 V	4.4	4.49		4.4		4.4	V	
		5.5 V	5.4	5.49		5.4		5.4		
	I <sub>OH</sub> = -24 mA	4.5 V		3.86		3.7		3.76		
		5.5 V		4.86		4.7		4.76		
	I <sub>OH</sub> = -75 mA <sup>(1)</sup>	5.5 V						3.85		
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	4.5 V		0.001	0.1		0.1	0.1	V	
		5.5 V		0.001	0.1		0.1	0.1		
	I <sub>OL</sub> = 24 mA	4.5 V			0.36		0.5	0.44		
		5.5 V			0.36		0.5	0.44		
	I <sub>OL</sub> = 75 mA <sup>(1)</sup>	5.5 V						1.65		
I <sub>OZ</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V			±0.25		±5	±2.5	μA	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5 V			±0.1		±1	±1	μA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V			4		80	40	μA	
ΔI <sub>CC</sub> <sup>(2)</sup>	One input at 3.4 V, Other inputs at GND or V <sub>CC</sub>	5.5 V		0.6			1.6	1.5	mA	
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2.5					pF	
C <sub>o</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		8					pF	

(1) Not more than one output should be tested at a time, and the duration of the test should not exceed 2 ms.

(2) This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V<sub>CC</sub>.

## Switching Characteristics

over recommended operating free-air temperature range, V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see [Figure 1](#))

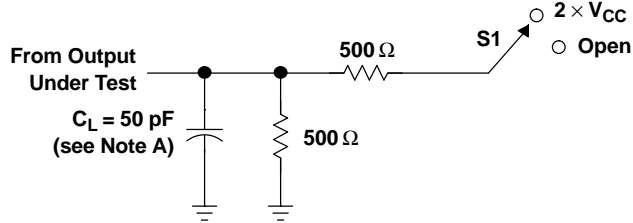
PARAMETER	FROM (INPUT)	TO (OUTPUT)	T <sub>A</sub> = 25°C			SN74ACT244M-EP		SN74ACT244I-EP		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	2	6.5	9	1	10	1.5	10	ns
t <sub>PHL</sub>			2	7	9	1	10	1.5	10	
t <sub>PZH</sub>	$\overline{OE}$	Y	1.5	7	8.5	1	9.5	1	9.5	ns
t <sub>PZL</sub>			2	7	9.5	1	11	1.5	10.5	
t <sub>PHZ</sub>	$\overline{OE}$	Y	2	8	9.5	1	11	1.5	10.5	ns
t <sub>PLZ</sub>			2.5	7.5	10	1	11.5	2	10.5	

## Operating Characteristics

V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

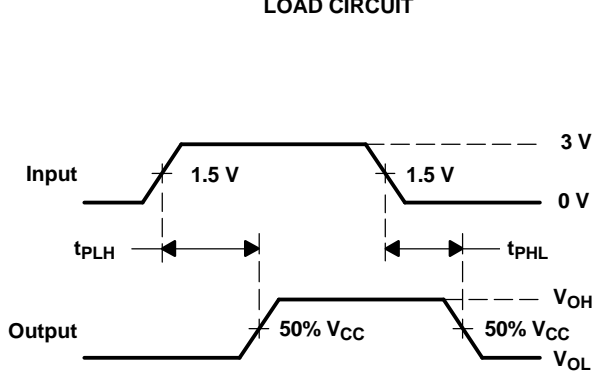
PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	C <sub>L</sub> = 50 pF, f = 1 MHz	45	pF

**PARAMETER MEASUREMENT INFORMATION**

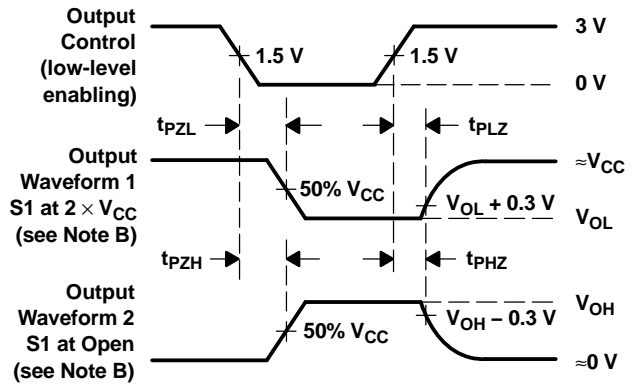


TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$
$t_{PHZ}/t_{PZH}$	Open

**LOAD CIRCUIT**



**VOLTAGE WAVEFORMS**



**VOLTAGE WAVEFORMS**

- 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:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .  
D. The outputs are measured one at a time, with one input transition per measurement.

**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)
<a href="#">SN74ACT244IDWREP</a>	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	SACT244IEP
SN74ACT244IDWREP.A	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	SACT244IEP
<a href="#">SN74ACT244MNSREP</a>	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	SACT244MEP
SN74ACT244MNSREP.A	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	SACT244MEP
<a href="#">V62/04620-01YE</a>	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	SACT244MEP
<a href="#">V62/04620-02XE</a>	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	SACT244IEP

(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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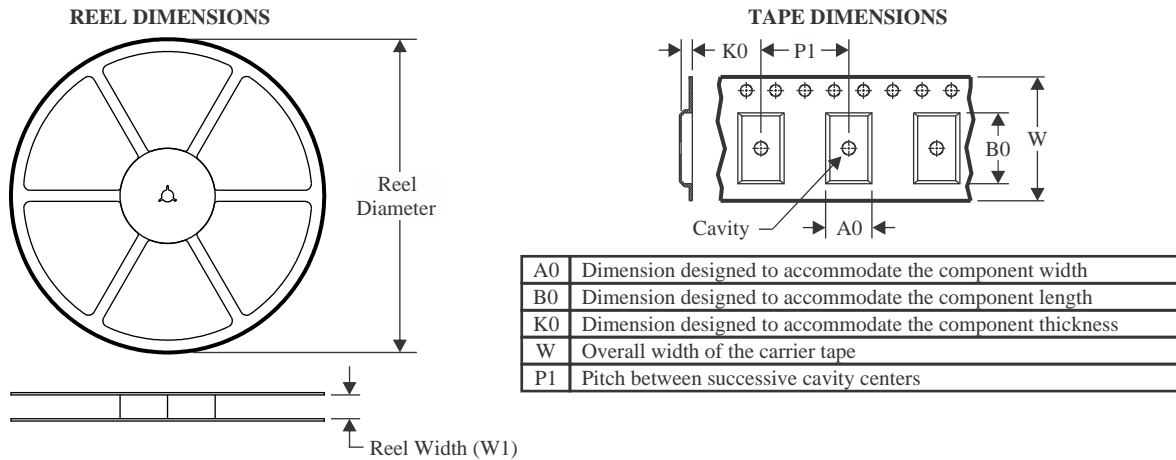
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN74ACT244-EP :**

- Catalog : [SN74ACT244](#)
- Automotive : [SN74ACT244-Q1](#)
- Military : [SN54ACT244](#)

## NOTE: Qualified Version Definitions:

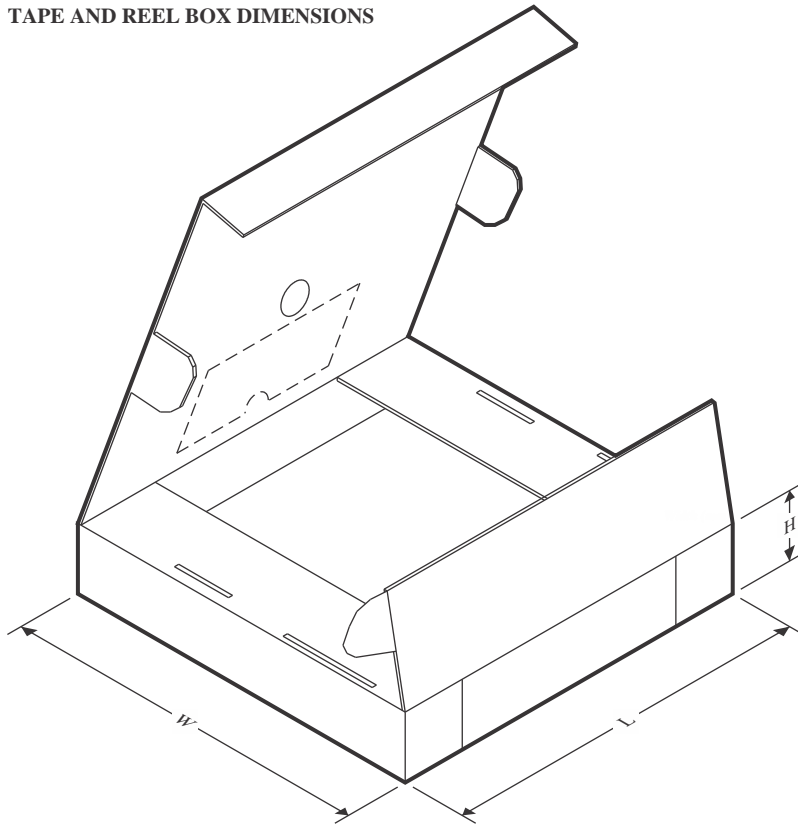
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications

**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
SN74ACT244IDWREP	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ACT244MNSREP	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ACT244IDWREP	SOIC	DW	20	2000	356.0	356.0	45.0
SN74ACT244MNSREP	SOP	NS	20	2000	356.0	356.0	45.0

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

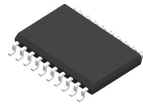
PLASTIC SMALL-OUTLINE PACKAGE

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.

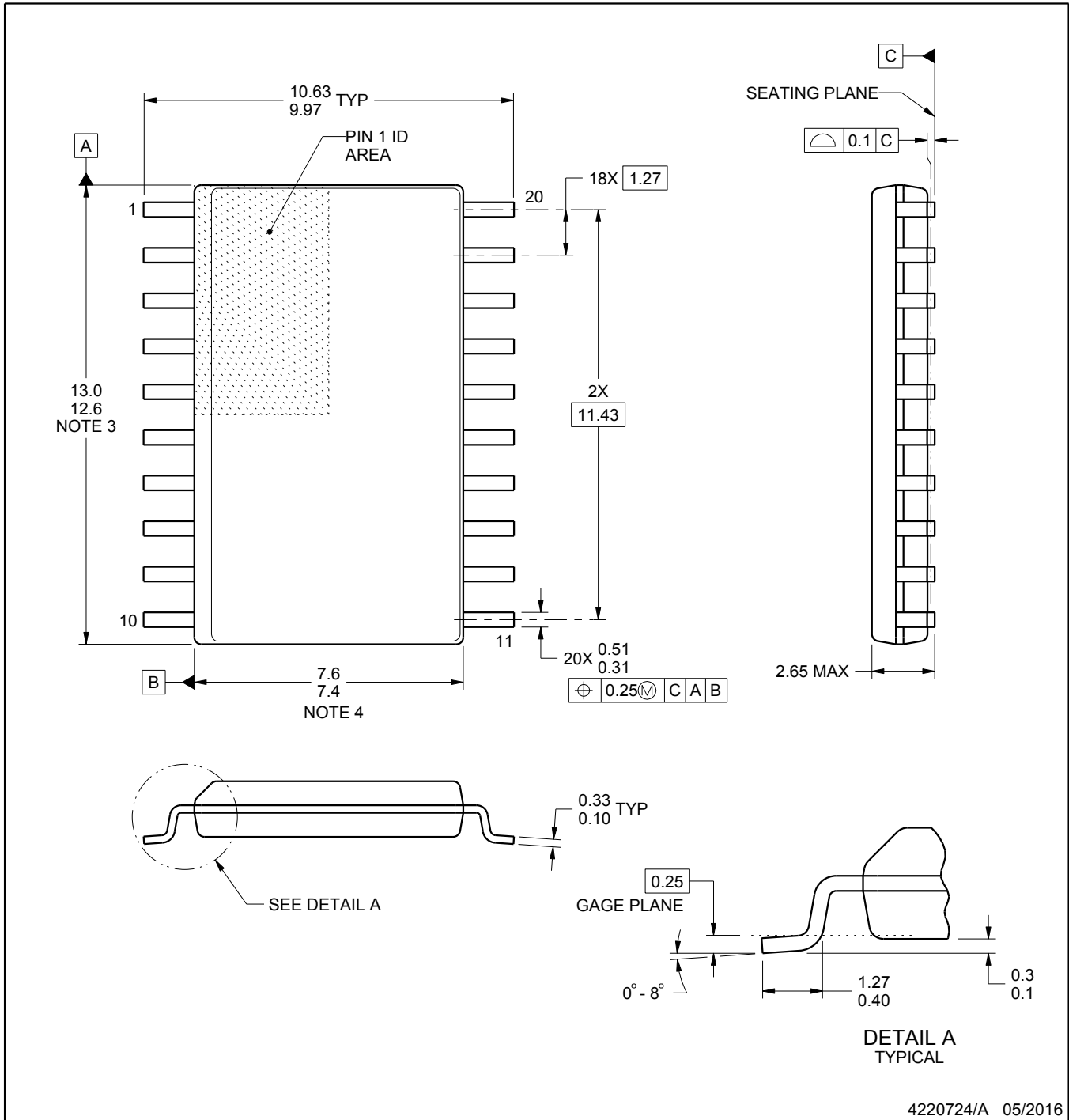
# DW0020A



# PACKAGE OUTLINE

## SOIC - 2.65 mm max height

SOIC



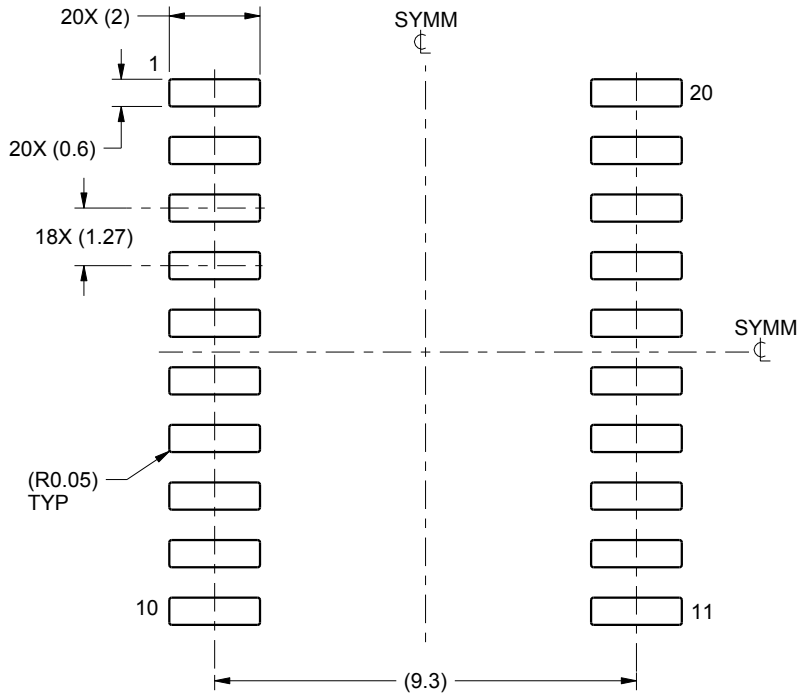
4220724/A 05/2016

# EXAMPLE BOARD LAYOUT

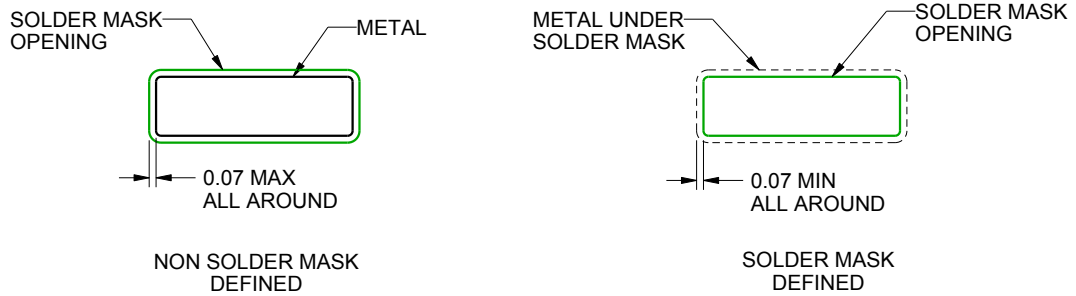
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

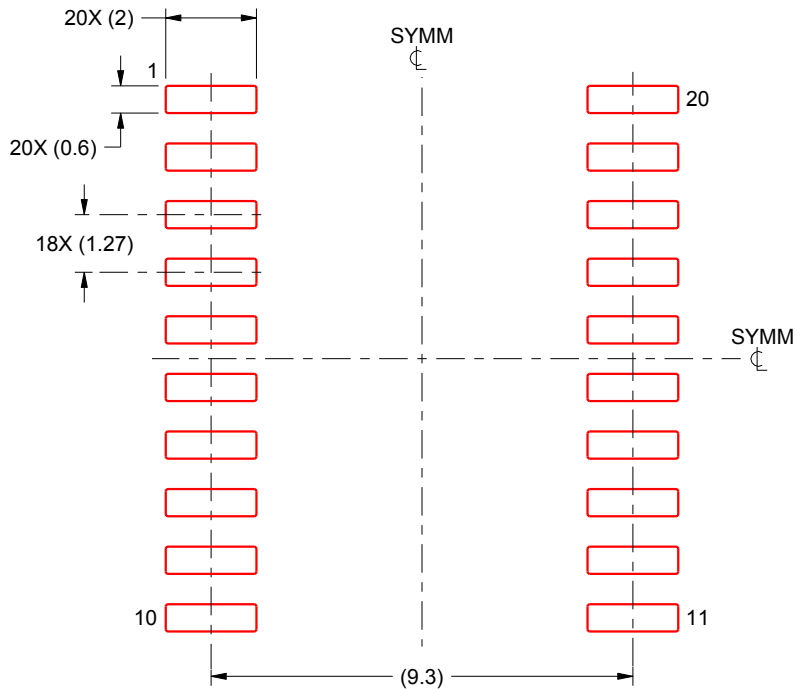
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

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.

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