

SN74AHCT244Q Octal Buffer/driver with 3-State Outputs

1 Features

- Q devices meet automotive performance requirements
- Customer-specific configuration control can be supported along with major-change approval
- EPIC™ (Enhanced-Performance Implanted CMOS) process
- Inputs are TTL-Voltage compatible Latch-Up performance exceeds 250 mA per JESD 17

2 Description

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

Package Information

PART NUMBER	PACKAGE ¹	BODY SIZE (NOM)
SN74AHCT244Q	DW (SOIC, 20)	12.80 mm × 7.50 mm
	PW (TSSOP, 20)	6.5 mm × 4.4 mm

1. For all available packages, see the orderable addendum at the end of the data sheet.

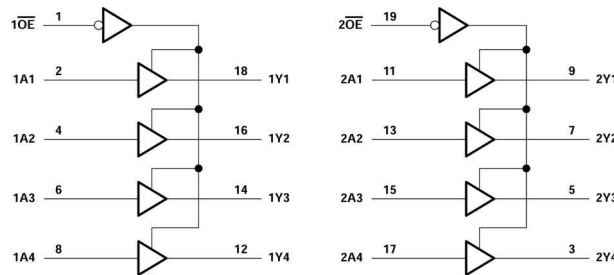


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3 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (February 2002) to Revision A (May 2023)	Page
• Added <i>Package Information</i> table, <i>Pin Functions</i> table, and <i>Thermal Information</i> table.....	1

4 Pin Configuration and Functions

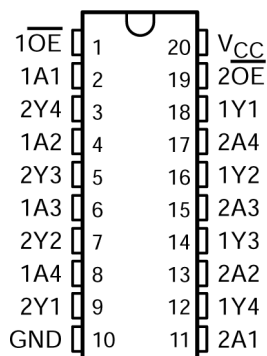


Figure 4-1. DW or PW Package (Top View)

Pin Functions

PIN		I/O1	DESCRIPTION
Name	NO.		
1OE	1	I	Bank 1, output enable, active low
1A1	2	I	Bank 1, channel 1 input
2Y4	3	O	Bank 2, channel 4 output
1A2	4	I	Bank 1, channel 2 input
2Y3	5	O	Bank 2, channel 3 output
1A3	6	I	Bank 1, channel 3 input
2Y2	7	O	Bank 2, channel 2 output
1A4	8	I	Bank 1, channel 4 input
2Y1	9	O	Bank 2, channel 1 output
GND	10	—	Ground
2A1	11	I	Bank 2, channel 1 input
1Y4	12	O	Bank 1, channel 4 output
2A2	13	I	Bank 2, channel 2 input
1Y3	14	O	Bank 1, channel 3 output
2A3	15	I	Bank 2, channel 3 input
1Y2	16	O	Bank 1, channel 2 output
2A4	17	I	Bank 2, channel 4 input
1Y1	18	O	Bank 1, channel 1 output
2OE	19	I	Bank 2, output enable, active low
V _{CC}	20	—	Positive supply

5 Specifications

5.1 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 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			±75		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.

5.2 Recommended Operating Conditions

(see [Note 1](#))

		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	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
T_A	Operating free-air temperature	–40	125	°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.

5.3 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74AHCT244Q		UNIT
		DW (SOIC)	PW (TSSOP)	
		20 PINS	20 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	58	83	°C/W

- (1) For more information about traditional and new thermal metrics, see [Semiconductor and IC Package Thermal Metrics](#).

5.4 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{CC}	T _A = 25°C			MIN	MAX	UNIT
			MIN	TYP	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 _{OZ}	V _O = V _{CC} or GND	5.5 V			±0.25		±2.5	µA
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
ΔI _{CC} ⁽¹⁾	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5	mA
C _i	V _I = V _{CC} or GND	5 V		2.5	10			pF
C _O	V _O = V _{CC} or gnd	5 V		3				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}.

5.5 Switching Characteristics

over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see [Figure 6-1](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T _A = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t _{PLH}	A	Y	C _L = 15 pF		5.4	7.4	1	8.5	ns
t _{PHL}					5.4	7.4	1	8.5	
t _{PZH}	\overline{OE}	Y	C _L = 15 pF		7.7	10.4	1	12	ns
t _{PZL}					7.7	10.4	1	12	
t _{PHZ}	\overline{OE}	Y	C _L = 15 pF		5	9.4	1	10	ns
t _{PLZ}					5	9.4	1	10	
t _{PLH}	A	Y	C _L = 50 pF		5.9	8.4	1	9.5	ns
t _{PHL}					5.9	8.4	1	9.5	
t _{PZH}	\overline{OE}	Y	C _L = 50 pF		8.2	11.4	1	13	ns
t _{PZL}					8.2	11.4	1	13	
t _{PHZ}	\overline{OE}	Y	C _L = 50 pF		8.8	11.4	1	13	ns
t _{PLZ}					8.8	11.4	1	13	
t _{sk(o)}			C _L = 50 pF			1			ns

5.6 Noise Characteristics

$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see [Note 1](#))

PARAMETER		MIN	TYP	MAX	UNIT
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		4.1		V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

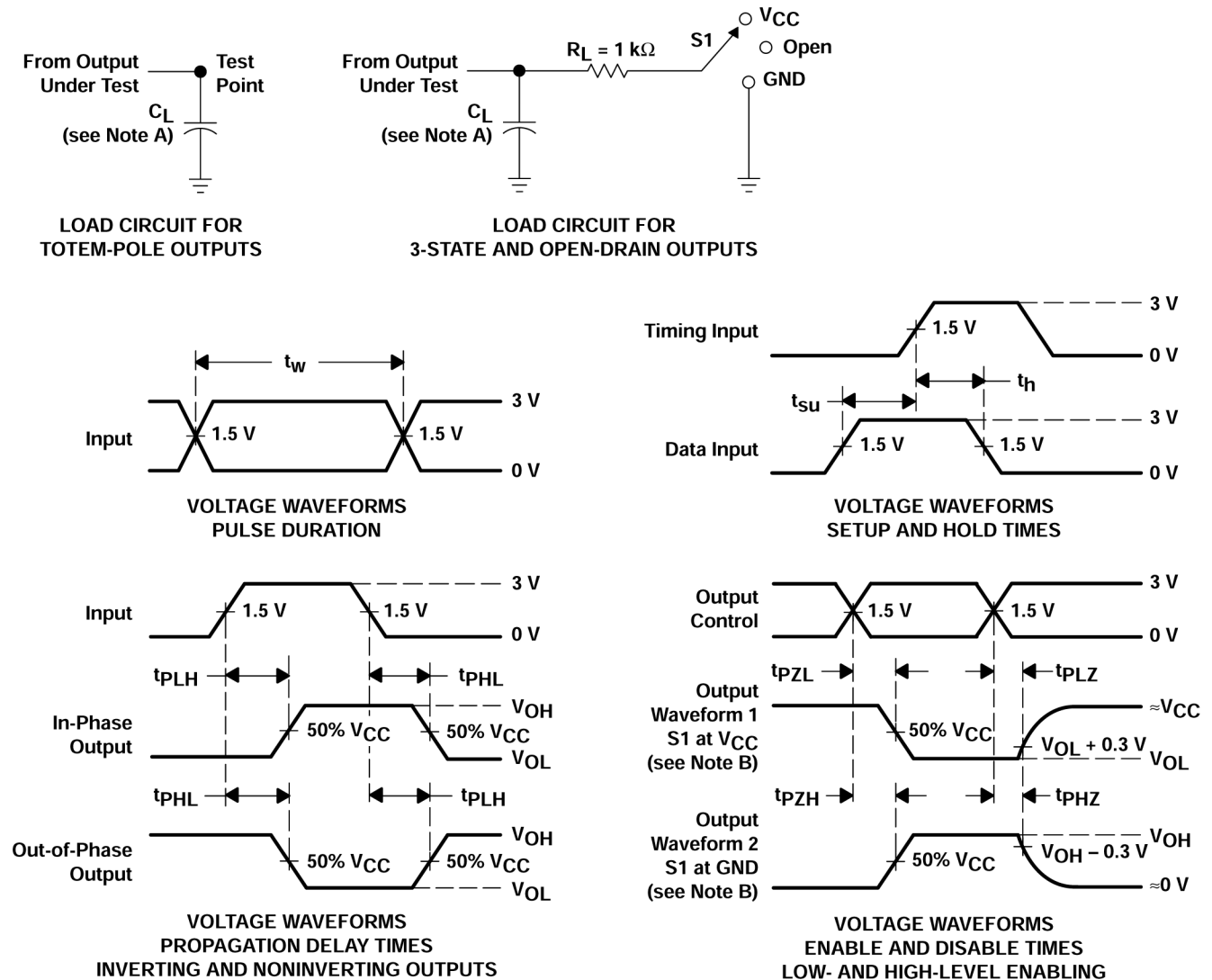
(1) Characteristics are for surface-mount packages only.

5.7 Operating Characteristics

$V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	8.2	pF

6 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.

Figure 6-1. 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}

7 Detailed Description

7.1 Overview

The SN74AHCT244Q is organized as two 4-bit buffers/line drivers with separate output-enable (\overline{OE}) inputs. When \overline{OE} is low, the device passes data from the A inputs to the Y outputs. When \overline{OE} is high, the outputs are in the high-impedance state.

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

7.2 Functional Block Diagram

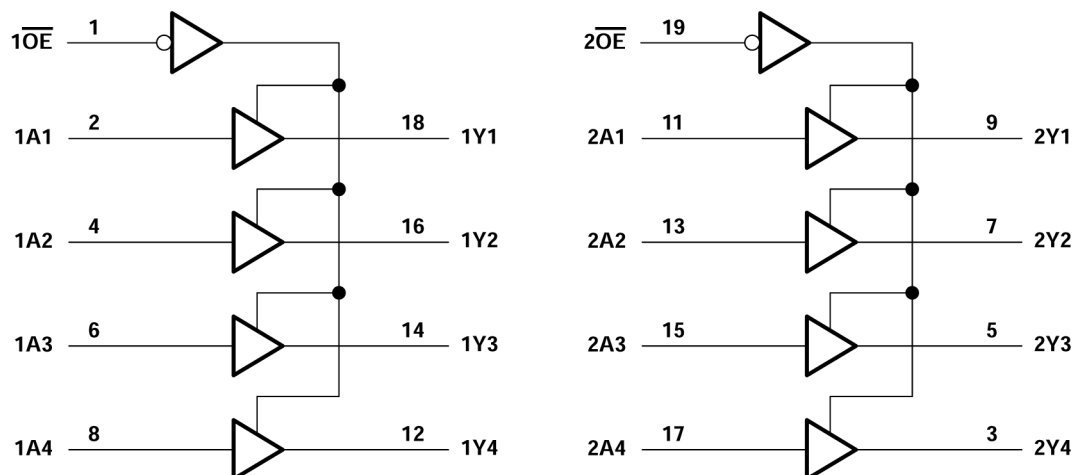


Figure 7-1. Logic Diagram (Positive Logic)

This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

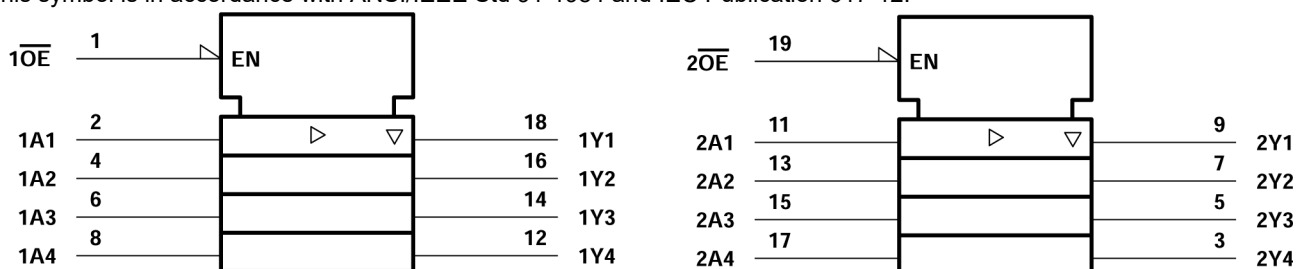


Figure 7-2. Logic Symbol

7.3 Device Functional Modes

Table 7-1. Function Table (Each 4-Bit Buffer/driver)

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

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)
SN74AHCT244QDWR	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT244Q
SN74AHCT244QDWR.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	AHCT244Q
SN74AHCT244QPWR	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB244Q
SN74AHCT244QPWR.A	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB244Q
SN74AHCT244QPWRG4	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-	HB244Q
SN74AHCT244QPWRG4.A	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	HB244Q

⁽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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TAPE AND REEL INFORMATION



*All dimensions are nominal

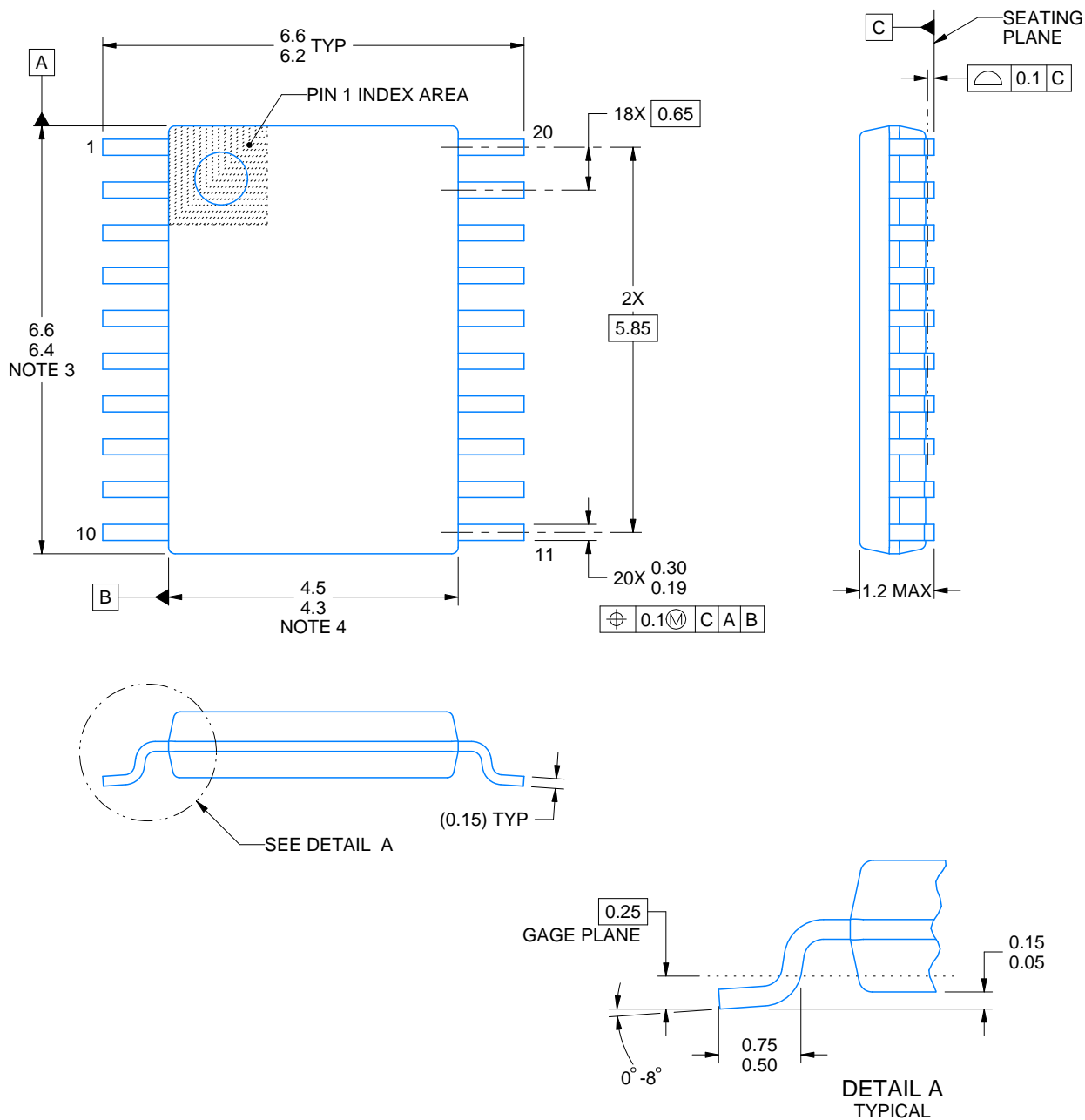
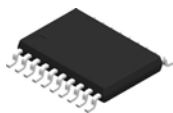
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT244QDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHCT244QPWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1
SN74AHCT244QPWRG4	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	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)
SN74AHCT244QDWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74AHCT244QPWR	TSSOP	PW	20	2000	353.0	353.0	32.0
SN74AHCT244QPWRG4	TSSOP	PW	20	2000	353.0	353.0	32.0



4220206/A 02/2017

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

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220206/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

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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

4220206/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.



4220724/A 05/2016

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-013.

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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