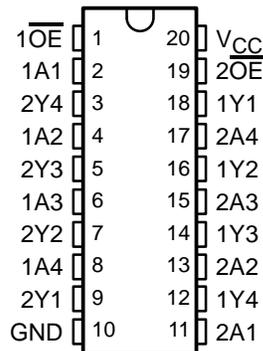


# SN74AHCT244-EP OCTAL BUFFER/DRIVER WITH 3-STATE OUTPUTS

SCLS493A – MAY 2003 – REVISED JUNE 2003

- **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†**
- **EPIC™ (Enhanced-Performance Implanted CMOS) Process**
- **Inputs Are TTL-Voltage Compatible**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds 1000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**

DW OR PW PACKAGE  
(TOP VIEW)



† 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 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.

The SN74AHCT244 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.

## ORDERING INFORMATION

T <sub>A</sub>	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
	SOIC – D	Tape and reel		
–55°C to 125°C	TSSOP – PW	Tape and reel	SN74AHCT244MDWREP	AHCT244MEP
			SN74AHCT244MPWREP	AHT244EP

‡ 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).



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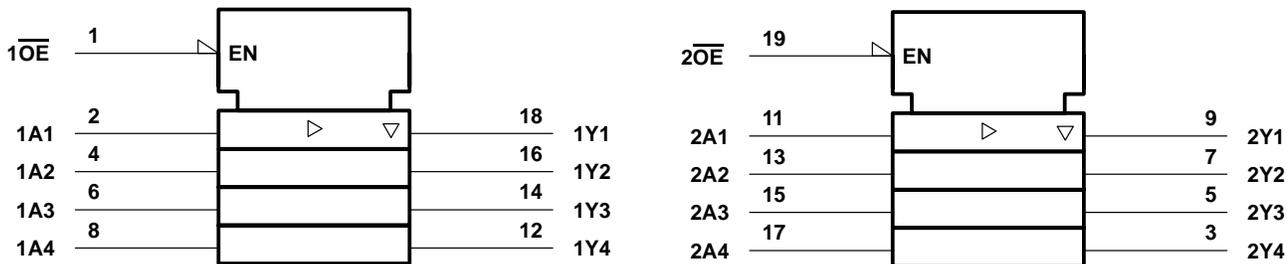
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**SN74AHCT244-EP**  
**OCTAL BUFFER/DRIVER**  
**WITH 3-STATE OUTPUTS**  
 SCLS493A – MAY 2003 – REVISED JUNE 2003

**FUNCTION TABLE**  
 (each 4-bit buffer/driver)

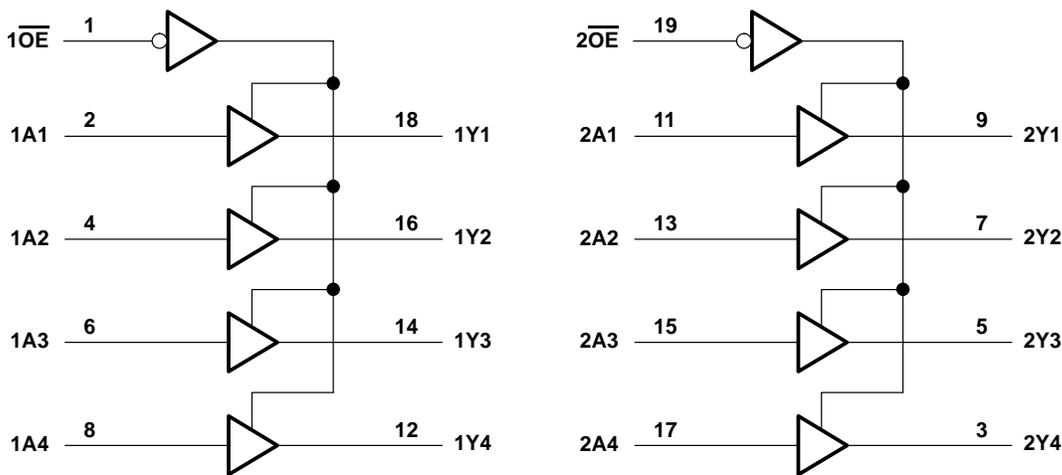
INPUTS		OUTPUT Y
$\overline{OE}$	A	
L	H	H
L	L	L
H	X	Z

**logic symbol†**



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

**logic diagram (positive logic)**



# SN74AHCT244-EP OCTAL BUFFER/DRIVER WITH 3-STATE OUTPUTS

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## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, $V_{CC}$	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1)	–0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±25 mA
Continuous current through $V_{CC}$ or GND	±75 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DW package	58°C/W
PW package	83°C/W
Storage temperature range, $T_{stg}$	–65°C to 150°C

† 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.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51-7

## recommended operating conditions (see Note 3)

		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	–55	125	°C

NOTE 3: 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	$V_{CC}$	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$V_{OH}$	$I_{OH} = -50 \mu\text{A}$	4.5 V	4.4	4.5		4.4		V
	$I_{OH} = -8 \text{ mA}$					3.8		
$V_{OL}$	$I_{OL} = 50 \mu\text{A}$	4.5 V			0.1	0.1		V
	$I_{OL} = 8 \text{ mA}$				0.36	0.44		
$I_{OZ}$	$V_O = V_{CC}$ or GND	5.5 V			±0.25	±2.5		μA
$I_I$	$V_I = 5.5 \text{ V}$ 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
$\Delta I_{CC}^\ddagger$	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

‡ This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or  $V_{CC}$ .



**SN74AHCT244-EP**  
**OCTAL BUFFER/DRIVER**  
**WITH 3-STATE OUTPUTS**

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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

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

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

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

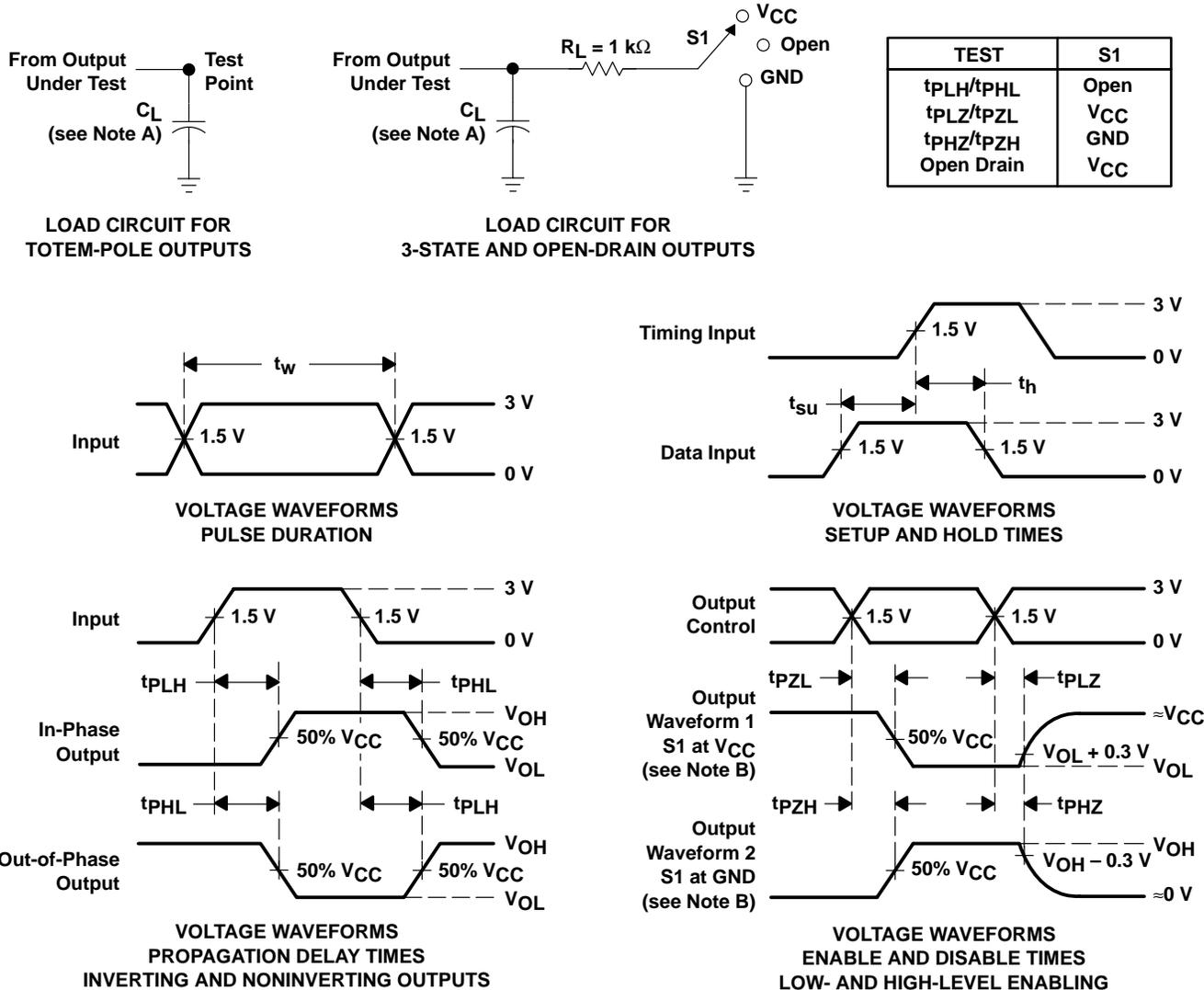
NOTE 4: Characteristics are for surface-mount packages only.

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



PARAMETER MEASUREMENT INFORMATION



- 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.

Figure 1. Load Circuit and Voltage Waveforms

**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
SN74AHCT244MDWREP	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHCT244MEP	<a href="#">Samples</a>
SN74AHCT244MPWREP	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHT244EP	<a href="#">Samples</a>
V62/03657-01XE	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHT244EP	<a href="#">Samples</a>
V62/03657-01YE	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AHCT244MEP	<a href="#">Samples</a>

(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.

**OBSELETE:** 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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**OTHER QUALIFIED VERSIONS OF SN74AHCT244-EP :**

- Catalog: [SN74AHCT244](#)
- Automotive: [SN74AHCT244-Q1](#)
- Military: [SN54AHCT244](#)

**NOTE: Qualified Version Definitions:**

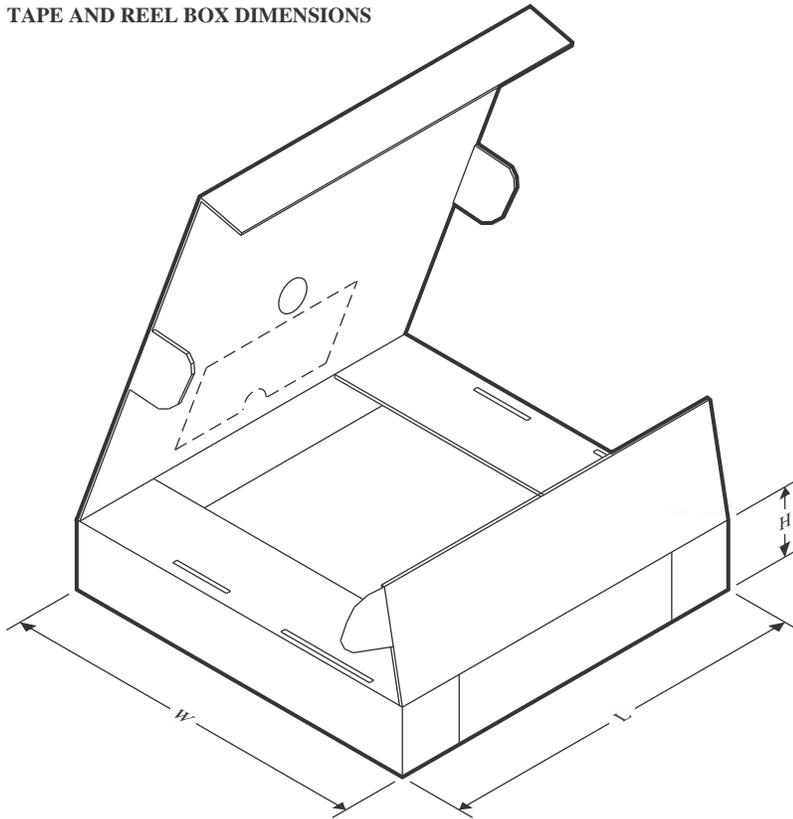
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications

**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
SN74AHCT244MDWREP	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHCT244MPWREP	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	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)
SN74AHCT244MDWREP	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHCT244MPWREP	TSSOP	PW	20	2000	356.0	356.0	35.0

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