

# SN74ALVC16244 16-BIT BUFFER/DRIVER WITH 3-STATE OUTPUTS

SCAS250 – JANUARY 1993 – REVISED JANUARY 1994

- Member of the Texas Instruments *Widebus™* Family
- *EPIC™* (Enhanced-Performance Implanted CMOS) Submicron Process
- Designed to Facilitate Incident-Wave Switching for Line Impedances of 50 Ω or Greater
- Bus-Hold On Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Package Options Include Plastic 300-mil Shrink Small-Outline (DL) and Thin Shrink Small-Outline (DGG) Packages

## description

This 16-bit buffer/driver is designed for 2.7-V to 3.6-V  $V_{CC}$  operation.

The SN74ALVC16244 is designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

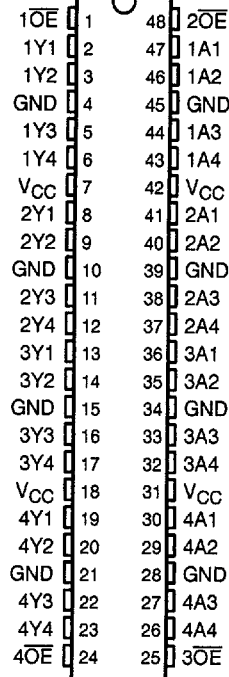
The device can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. It provides true outputs and symmetrical  $\overline{OE}$  (active-low output-enable) inputs.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

The SN74ALVC16244 is available in TI's shrink small-outline (DL) and thin shrink small-outline (DGG) packages, which provide twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN74ALVC16244 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

## DGG OR DL PACKAGE (TOP VIEW)



FUNCTION TABLE  
(each 4-bit buffer)

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

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PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

 **TEXAS  
INSTRUMENTS**

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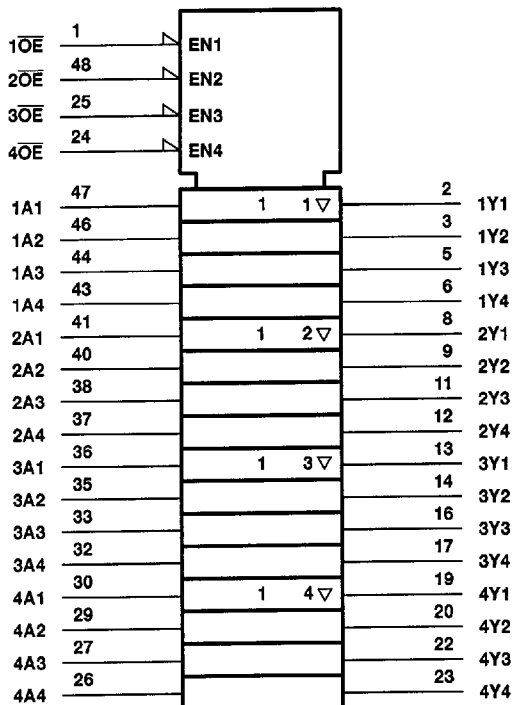
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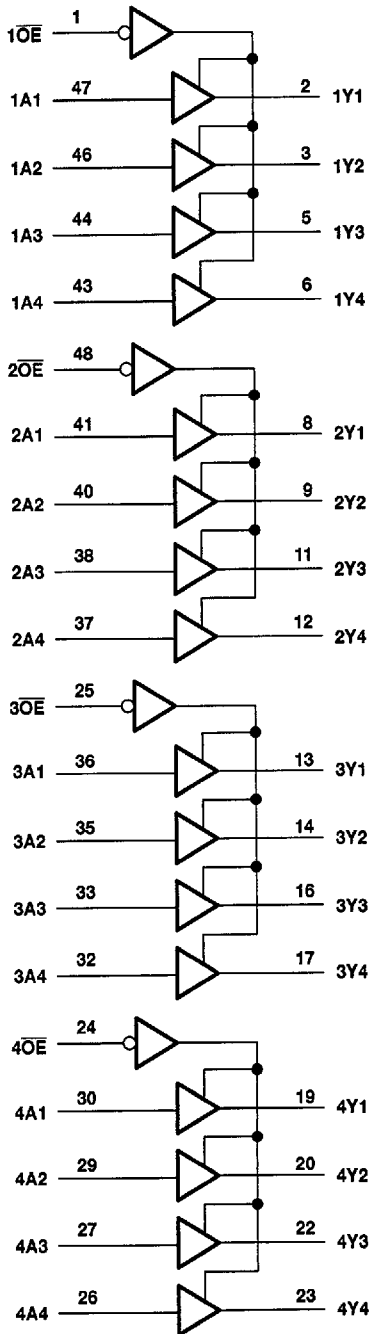
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**logic symbol**



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

**logic diagram (positive logic)**



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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 4.6 V
Input voltage range, $V_I$ (see Note 1) .....	-0.5 V to 4.6 V
Output voltage range, $V_O$ (see Notes 1 and 2) .....	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	-50 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	±50 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	±50 mA
Continuous current through $V_{CC}$ or GND .....	±100 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 3): DGG package .....	0.85 W
DL package .....	1.2 W
Storage temperature range .....	-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 clamp-current ratings are observed.  
 2. This value is limited to 4.6 V maximum.  
 3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils. For more information, refer to the *Package Thermal Considerations* application note.

**recommended operating conditions**

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage	2.7	3.6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2.7$ V to 3.6 V		V
$V_{IL}$	Low-level input voltage	$V_{CC} = 2.7$ V to 3.6 V		V
$V_I$	Input voltage	0	$V_{CC}$	V
$V_O$	Output voltage	0	$V_{CC}$	V
$I_{OH}$	High-level output current	$V_{CC} = 2.7$ V	-12	mA
		$V_{CC} = 3$ V	-24	
$I_{OL}$	Low-level output current	$V_{CC} = 2.7$ V	12	mA
		$V_{CC} = 3$ V	24	
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	ns/V
$T_A$	Operating free-air temperature	-40	85	°C

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

PARAMETER		TEST CONDITIONS	V <sub>CC</sub> †	MIN	TYP	MAX	UNIT
V <sub>OH</sub>		I <sub>OH</sub> = -100 μA	MIN to MAX	V <sub>CC</sub> -0.2			V
		I <sub>OH</sub> = -12 mA	2.7 V	2.2			
		I <sub>OH</sub> = -24 mA	3 V	2.4			
V <sub>OL</sub>		I <sub>OL</sub> = 100 μA	MIN to MAX	0.2			V
		I <sub>OL</sub> = 12 mA	2.7 V	0.4			
		I <sub>OL</sub> = 24 mA	3 V	0.55			
I <sub>I</sub>	Inputs	V <sub>I</sub> = V <sub>CC</sub> or GND	3.6 V	±5			μA
I <sub>I</sub> (hold)	Data pins	V <sub>I</sub> = 0.8 V	3 V	75			μA
		V <sub>I</sub> = 2 V		-75			
I <sub>OZ</sub>		V <sub>O</sub> = V <sub>CC</sub> or GND	3.6 V	±10			μA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	3.6 V	40			μA
ΔI <sub>CC</sub>		V <sub>CC</sub> = 3 V to 3.6 V, One input at V <sub>CC</sub> - 0.6 V, Other inputs at V <sub>CC</sub> or GND		750			μA
C <sub>i</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V	3.5			pF
C <sub>o</sub>		V <sub>O</sub> = V <sub>CC</sub> or GND	3.3 V				pF

† For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

switching characteristics over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Note 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 3.3 V ± 0.3 V			V <sub>CC</sub> = 2.7 V		UNIT
			MIN	TYP	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	1	2.2	3.6	4		ns
t <sub>en</sub>	$\overline{OE}$	Y	1	2.7	5	6		ns
t <sub>dis</sub>	$\overline{OE}$	Y	1	2.9	5	5.2		ns

NOTE 4: Load circuit and voltage waveforms are shown in Section 1.

operating characteristics, V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25° C

PARAMETER		TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance per bit	Outputs enabled	16	pF
		Outputs disabled	5	

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