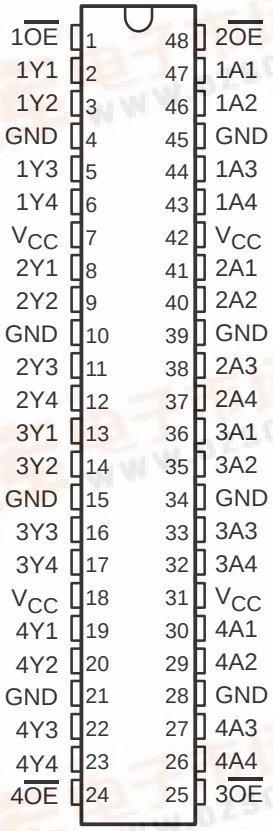
SN54ACT16244, 74ACT16244
16-BIT BUFFERS/LINE DRIVERS WITH 3-STATE OUTPUTS

SCAS116B – MARCH 1990 – REVISED APRIL 1996

- **Members of the Texas Instruments *Widebus*™ Family**
- **Inputs Are TTL-Voltage Compatible**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Distributed V_{CC} and GND Pin Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**
- **Package Options Include Plastic Shrink Small-Outline (DL) and Thin Shrink Small-Outline (DGG) Packages, and 380-mil Fine-Pitch Ceramic Flat (WD) Packages Using 25-mil Center-to-Center Pin Spacings**

SN54ACT16244 . . . WD PACKAGE
74ACT16244 . . . DGG OR DL PACKAGE
(TOP VIEW)



description

The SN54ACT16244 and 74ACT16244 are 16-bit buffers/line drivers designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. They can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. The devices provide true outputs and symmetrical $\overline{OE}$ (active-low) output-enable inputs.

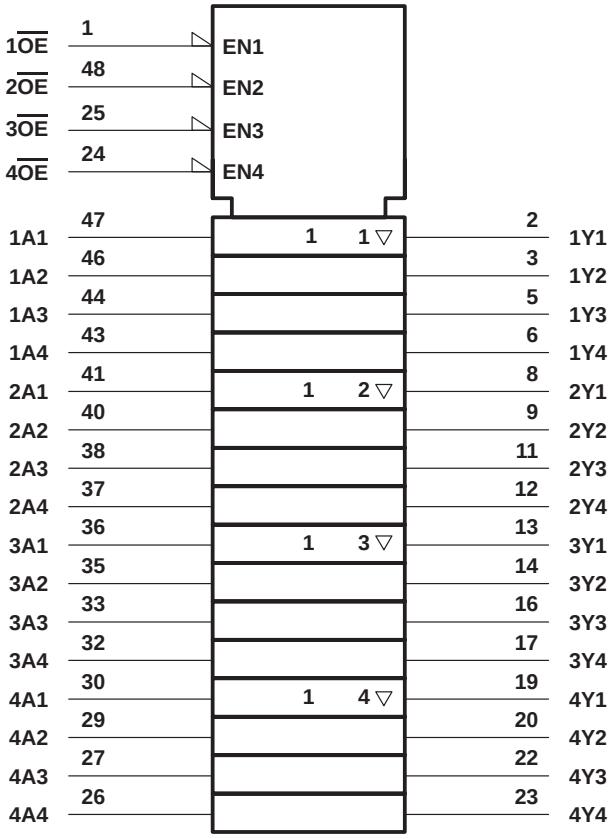
The 74ACT16244 is packaged in TI's shrink small-outline package, which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN54ACT16244 is characterized for operation over the full military temperature range of –55°C to 125°C. The 74ACT16244 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each driver)

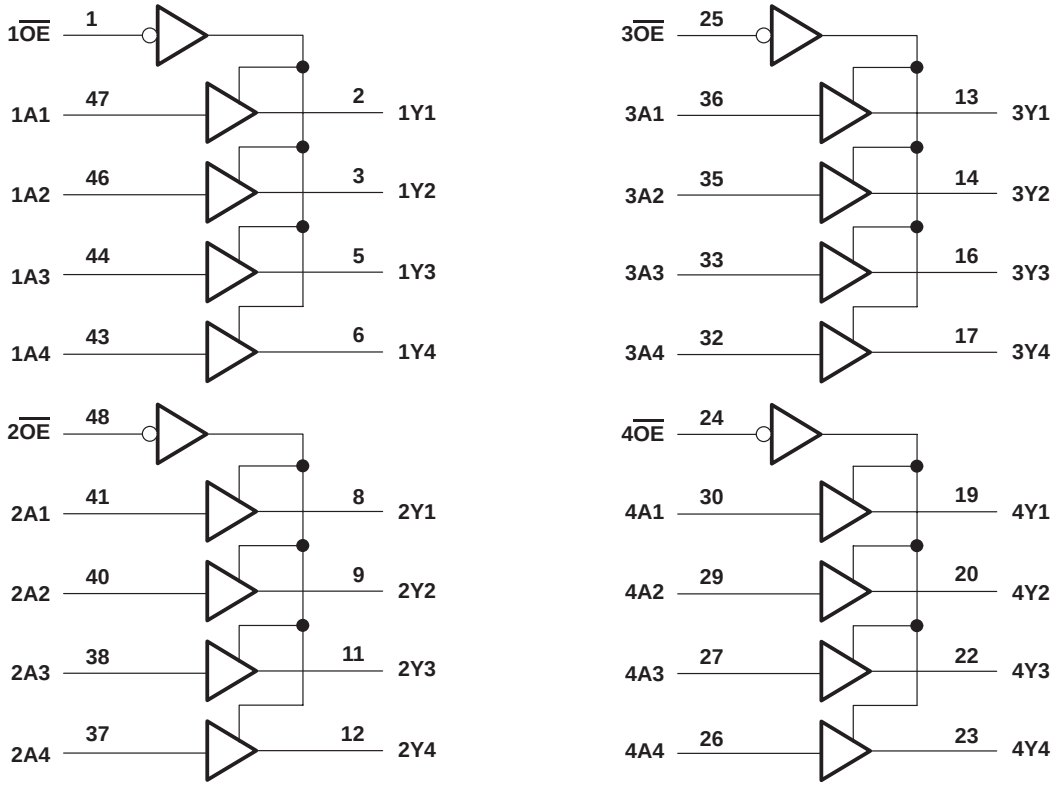
INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

logic symbol†



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

logic diagram (positive logic)



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 V_{CC} + 0.5 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 or V_I > V_{CC}) . . . . . ±20 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 . . . . . ±400 mA
Maximum power dissipation at T_A = 55°C (in still air) (see Note 2): DGG package . . . . . 0.85 W
DL package . . . . . 1.2 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

recommended operating conditions (see Note 3)

		SN54ACT16244		74ACT16244		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage (see Note 4)	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–24		–24	mA
I_{OL}	Low-level output current		24		24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	0	10	ns/V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTES: 3. Unused inputs should be tied to V_{CC} through a pullup resistor of approximately 5 kΩ or greater to prevent them from floating.
4. All V_{CC} and GND pins must be connected to the proper voltage supply.

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54ACT16244		74ACT16244		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = –50 μA	4.5 V	4.4			4.4		4.4		V
		5.5 V	5.4			5.4		5.4		
	I_{OH} = –24 mA	4.5 V	3.94			3.7		3.8		
		5.5 V	4.94			4.7		4.8		
	I_{OH} = –50 mA†	5.5 V				3.85				
	I_{OH} = –75 mA†	5.5 V						3.85		
V_{OL}	I_{OL} = 50 μA	4.5 V			0.1		0.1		0.1	V
		5.5 V			0.1		0.1		0.1	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
	I_{OL} = 50 mA†	5.5 V					1.65			
	I_{OL} = 75 mA†	5.5 V							1.65	
I_I	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1		±1	μA
I_{OZ}	$V_O = V_{CC}$ or GND	5.5 V			±0.5		±10		±5	μA
I_{CC}	$V_I = V_{CC}$ or GND, I_O = 0	5.5 V			8		160		80	μA
ΔI_{CC}‡	One input at 3.4 V, Other inputs at GND or V_{CC}	5.5 V			0.9		1		1	mA
C_i	$V_I = V_{CC}$ or GND	5 V		4.5						pF
C_o	$V_O = V_{CC}$ or GND	5 V		13.5						pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.
‡ 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_{CC}.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ACT16244					UNIT
			T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	4	6.5	8.5	3	10.3	ns
t_{PHL}			3.4	6.3	8.7	3.4	10.1	
t_{PZH}	$\overline{OE}$	Y	3	5.8	8.1	3	10.5	ns
t_{PZL}			3.7	6.7	9.3	3.7	11	
t_{PHZ}	$\overline{OE}$	Y	5.4	8.1	11.5	5.4	13	ns
t_{PLZ}			5	7.5	9.5	5	10.9	

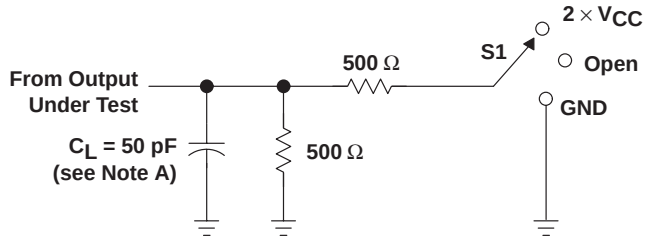
switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	74ACT16244					UNIT
			T_A = 25°C			MIN	MAX	
			MIN	TYP	MAX			
t_{PLH}	A	Y	4	6.5	8.5	4	9.4	ns
t_{PHL}			3.4	6.3	8.7	3.4	9.5	
t_{PZH}	$\overline{OE}$	Y	3	5.8	8.1	3	8.9	ns
t_{PZL}			3.7	6.7	9.3	3.7	10.3	
t_{PHZ}	$\overline{OE}$	Y	5.4	8.1	10.3	5.4	11.3	ns
t_{PLZ}			5	7.5	9.5	5	10.3	

operating characteristics, V_{CC} = 5 V, T_A = 25°C

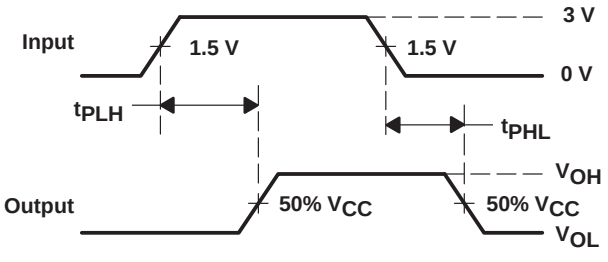
PARAMETER			TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	Outputs enabled	C_L = 50 pF,	f = 1 MHz	39	pF
		Outputs disabled			11	

PARAMETER MEASUREMENT INFORMATION

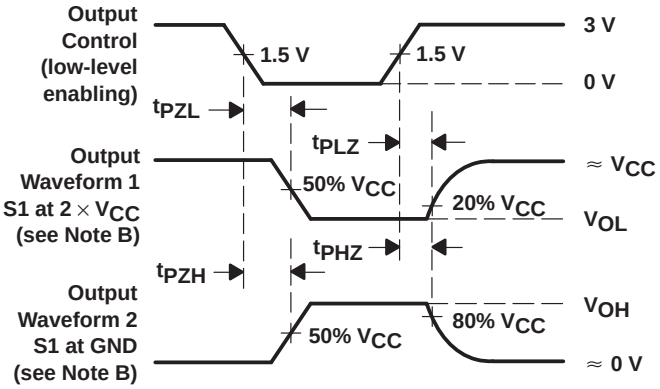


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	2 × V_{CC}
t_{PHZ}/t_{PZH}	GND

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 ≤ 1 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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