

# 54AC11241, 74AC11241 OCTAL BUFFERS/LINE DRIVERS WITH 3-STATE OUTPUTS

SCAS032A – JULY 1987 – REVISED APRIL 1993

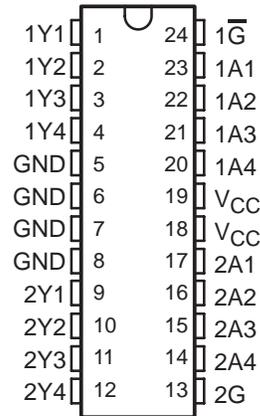
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Flow-Through Architecture Optimizes PCB Layout
- Center-Pin  $V_{CC}$  and GND Configurations Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1- $\mu$ m Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic Small-Outline Packages, Plastic Shrink Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

## description

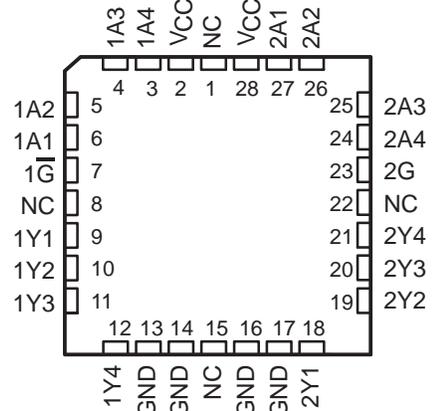
This octal buffer or line driver is designed specifically to improve both the performance and density of three-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. Taken together with the AC11240 and AC11244, these devices provide the choice of selected combinations of inverting and noninverting outputs, symmetrical  $\overline{G}$  (active-low output control) inputs, and complementary G and  $\overline{G}$  inputs. This device features a high fan-out.

The 54AC11241 is characterized for operation over the full military temperature range of -55°C to 125°C. The 74AC11241 is characterized for operation from -40°C to 85°C.

54AC11241 . . . JT PACKAGE  
74AC11241 . . . DB, DW OR NT PACKAGE  
(TOP VIEW)



54AC11241 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE

OUTPUT CONTROL $\overline{1G}$	DATA INPUT 1A	OUTPUT 1Y	OUTPUT CONTROL 2G	DATA INPUT 2A	OUTPUT 2Y
H	X	Z	L	X	Z
L	L	L	H	L	L
L	H	H	H	H	H

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**TEXAS  
INSTRUMENTS**

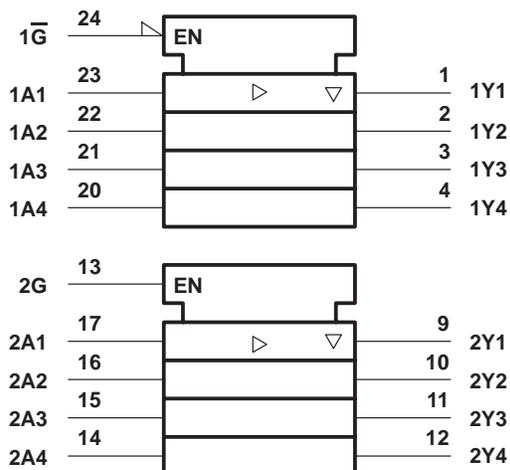
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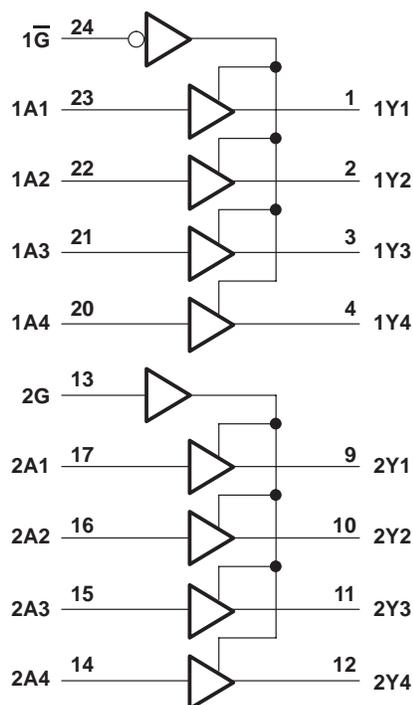
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## logic symbol†



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

## logic diagram (positive logic)



Pin numbers shown are for the DW, JT, and NT packages.

## 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 $V_I > V_{CC}$ ) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 50$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 50$ mA
Continuous current through $V_{CC}$ or GND .....	$\pm 200$ mA
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.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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## recommended operating conditions

		54AC11241			74AC11241			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	3	5	5.5	3	5	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 3 V		2.1	2.1		V	
		V <sub>CC</sub> = 4.5 V		3.15	3.15			
		V <sub>CC</sub> = 5.5 V		3.85	3.85			
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 3 V			0.9		V	
		V <sub>CC</sub> = 4.5 V			1.35			
		V <sub>CC</sub> = 5.5 V			1.65			
V <sub>I</sub>	Input voltage	0		V <sub>CC</sub>	0		V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	0		V <sub>CC</sub>	0		V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 3 V			-4		mA	
		V <sub>CC</sub> = 4.5 V			-24			
		V <sub>CC</sub> = 5.5 V			-24			
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 3 V			12		mA	
		V <sub>CC</sub> = 4.5 V			24			
		V <sub>CC</sub> = 5.5 V			24			
Δt/Δv	Input transition rise or fall rate	Data		0	10		ns/V	
		$\overline{G}$		0	5			
T <sub>A</sub>	Operating free-air temperature	-55		125	-40		85	°C

## 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			54AC11241		74AC11241		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	3 V	2.9			2.9		2.9	V	
		4.5 V	4.4			4.7		4.4		
		5.5 V	5.4			5.4		5.4		
	I <sub>OH</sub> = -4 mA	3 V	2.58			2.4		2.48		
		4.5 V	3.94			3.7		3.8		
	I <sub>OH</sub> = -24 mA	5.5 V	4.94			4.7		4.8		
		5.5 V				3.85				
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	3 V				0.1		0.1	V	
		4.5 V				0.1		0.1		
		5.5 V				0.1		0.1		
	I <sub>OL</sub> = 12 mA	3 V				0.36		0.44		
		4.5 V				0.36		0.44		
	I <sub>OL</sub> = 24 mA	5.5 V				0.36		0.44		
		5.5 V					1.65			
I <sub>OL</sub> = 75 mA <sup>†</sup>	5.5 V						1.65			
	5.5 V									
I <sub>OZ</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V			± 0.5		± 10	± 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			8		160	80	μA	
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V			4				pF	
C <sub>o</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND	5 V			10				pF	

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			54AC11241		74AC11241		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1.5	7	10	1.5	12.2	1.5	11.4	ns
$t_{PHL}$			1.5	6.2	8.4	1.5	10.2	1.5	9.2	
$t_{PZH}$	$\bar{G}$ or G	Y	1.5	7.8	11.4	1.5	13.8	1.5	12.9	ns
$t_{PZL}$			1.5	7.7	10.6	1.5	12.6	1.5	11.7	
$t_{PHZ}$	$\bar{G}$ or G	Y	1.5	5.8	7.6	1.5	8.2	1.5	7.9	ns
$t_{PLZ}$			1.5	7.1	9.3	1.5	10.3	1.5	9.9	

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)

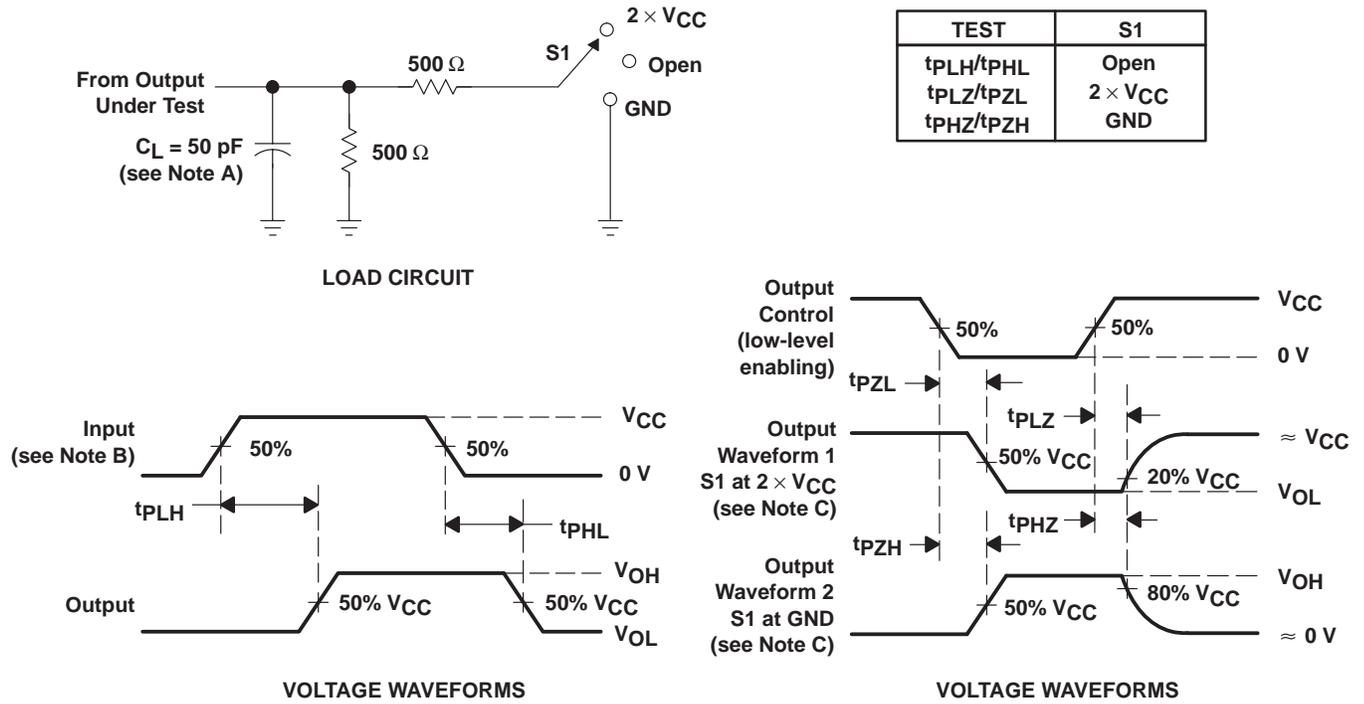
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			54AC11241		74AC11241		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$	A	Y	1.5	4.9	7.1	1.5	8.5	1.5	8	ns
$t_{PHL}$			1.5	4.5	6.3	1.5	7.2	1.5	6.8	
$t_{PZH}$	$\bar{G}$ or G	Y	1.5	5.4	8	1.5	9.7	1.5	9	ns
$t_{PZL}$			1.5	5.3	7.6	1.5	9	1.5	8.4	
$t_{PHZ}$	$\bar{G}$ or G	Y	1.5	4.9	6.6	1.5	7.2	1.5	6.9	ns
$t_{PLZ}$			1.5	5.6	7.5	1.5	8.3	1.5	8	

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

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance per buffer	$C_L = 50\text{ pF}$ , $f = 1\text{ MHz}$	26	pF
	Outputs enabled		10	
	Outputs disabled			



PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .  
 C. 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.  
 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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