- **State of the Art BiCMOS Design Significantly Reduces I_{CCZ}**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **P-N-P Inputs Reduce D-C Loading**
- **Data Flow-Through Pinout (All Inputs on Opposite Side from Outputs)**
- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

description

These octal buffers and line drivers are designed to have the performance of the popular SN54BCT240/SN74BCT240 series and, at the same time, offer a pinout with inputs and outputs on opposite sides of the package. This arrangement greatly enhances printed circuit board layout.

The three-state control gate is a 2-input NOR gate so that if either $\overline{G}1$ or $\overline{G}2$ is high, all eight outputs are in the high-impedance state.

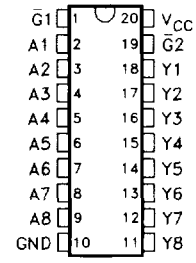
The SN54BCT541 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74BCT541 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

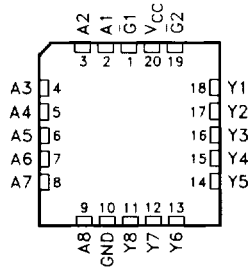
INPUTS			OUTPUT
$\overline{G}1$	$\overline{G}2$	A	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

Z = High Impedance

SN54BCT541 . . . J PACKAGE
SN74BCT541 . . . DW OR N PACKAGE
(TOP VIEW)



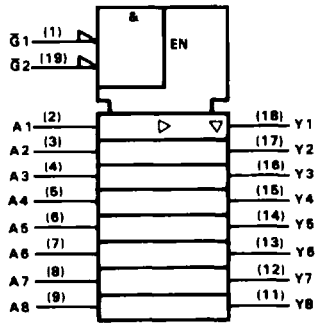
SN54BCT541 . . . FK PACKAGE
(TOP VIEW)



2

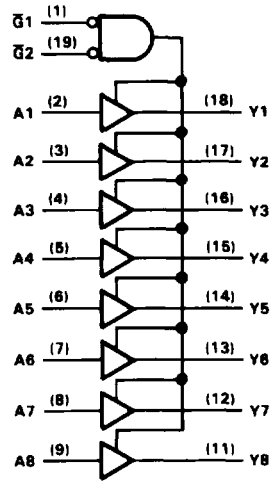
BiCMOS Circuits

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, V_{CC} ..... −0.5 V to 7 V
Input voltage (see Note 1) ..... −0.5 V to 7 V
Voltage applied to any output in the disabled or power-off state ..... −0.5 V to 5.5 V
Voltage applied to any output in the high state ..... −0.5 V to V_{CC}
Current into any output in the low state: SN54BCT541 ..... 96 mA
SN74BCT541 ..... 128 mA
Operating free-air temperature range: SN54BCT541 ..... −55°C to 125°C
SN74BCT541 ..... 0°C to 70°C
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 negative voltage rating may be exceeded if the input clamp current rating is observed.

recommended operating conditions

		SN54BCT541			SN74BCT541			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{IK}	Input clamp current			−18			−18	mA
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			48			64	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

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

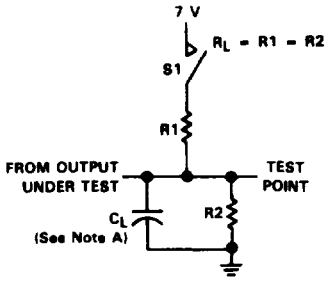
PARAMETER	TEST CONDITIONS†		SN54BCT541			SN74BCT541			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = 4.5 V, I_I = −18 mA				−1.2			−1.2	V
V_{OH}	V_{CC} = 4.5 V	I_{OH} = −3 mA	2.4	3.3		2.4	3.3		V
		I_{OH} = −12 mA	2	3.2					
		I_{OH} = −15 mA				2	3.1		
V_{OL}	V_{CC} = 4.5 V	I_{OL} = 48 mA		0.38	0.55				V
		I_{OL} = 64 mA					0.42	0.55	
I_{OZH}	V_{CC} = 5.5 V, V_O = 2.7 V				50			50	μA
I_{OZL}	V_{CC} = 5.5 V, V_O = 0.5 V				−50			−50	μA
I_I	V_{CC} = 5.5 V, V_I = 7 V				0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V, V_I = 2.7 V				20			20	μA
I_{IL}	V_{CC} = 5.5 V, V_I = 0.5 V				−0.6			−0.6	mA
I_{OS}§	V_{CC} = 5.5 V, V_O = 0		−100		−225	−100		−225	mA
I_{CCL}	V_{CC} = 5.5 V			47	72		47	72	mA
I_{CCH}	V_{CC} = 5.5 V			27	40		27	40	mA
I_{CCZ}	V_{CC} = 5.5 V			5	7		5	7	mA
C_i	V_{CC} = 5 V, V_I = 2.5 V or 0.5 V			5			5		pF
C_o	V_{CC} = 5 V, V_I = 2.5 V or 0.5 V			10			10		

† For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'BCT541			SN54BCT541		SN74BCT541		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	2.1	3.7	5.3	1.7	6.3	1.7	6	ns
t_{PHL}	A	Y	3.7	5.5	7.5	3.2	8.7	3.4	8.2	ns
t_{PZH}	$\overline{G}$	Y	5.3	7.2	9.3	4.4	11	4.6	10.7	ns
t_{PZL}	$\overline{G}$	Y	6	8	10.4	5.4	12.4	5.4	11.5	ns
t_{PHZ}	$\overline{G}$	Y	3.5	5.6	7.6	3	9.1	3	8.6	ns
t_{PLZ}	$\overline{G}$	Y	3.4	5.2	7.2	3	9.4	3	8.6	ns

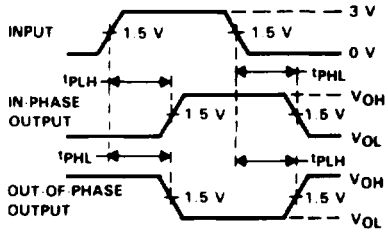
PARAMETER MEASUREMENT INFORMATION



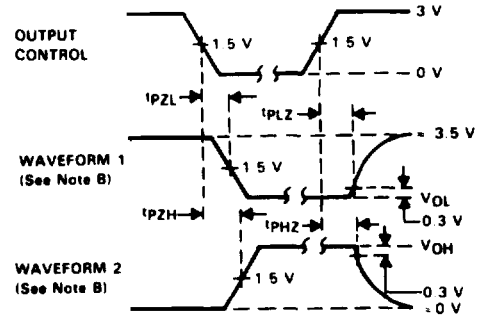
LOAD CIRCUIT

SWITCH POSITION TABLE

TEST	S1
t_{PLH}	Open
t_{PHL}	Open
t_{PZH}	Open
t_{PZL}	Closed
t_{PHZ}	Open
t_{PLZ}	Closed



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS

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 the generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.

FIGURE 1. SWITCHING CHARACTERISTICS