

SN54BCT245, SN74BCT245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

D3057, SEPTEMBER 1988—REVISED APRIL 1989

- BICMOS Design Substantially Reduces Standby Current
- 3-State Outputs Drive Bus Lines Directly
- ESD Protection Exceeds 2000 V per MIL-STD-883C Method 3015
- Comparable Speed and Improved Power Performance Relative to SN54F245, SN74F245
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. Implementing the control function minimizes external timing requirements.

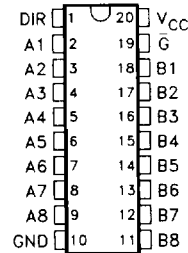
The devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic level at the direction control (DIR) input. The enable input (\bar{G}) can disable the device so that the buses are effectively isolated.

The SN54BCT245 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74BCT245 is characterized for operation from 0°C to 70°C .

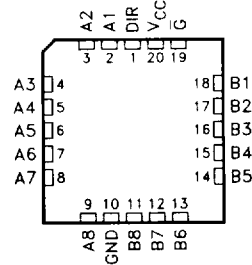
FUNCTION TABLE

ENABLE \bar{G}	DIRECTION CONTROL DIR	OPERATION
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

SN54BCT245 ... J PACKAGE
SN74BCT245 ... DW OR N PACKAGE
(TOP VIEW)



SN54BCT245 ... FK PACKAGE
(TOP VIEW)



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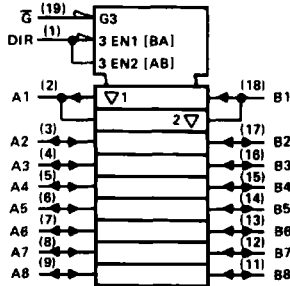
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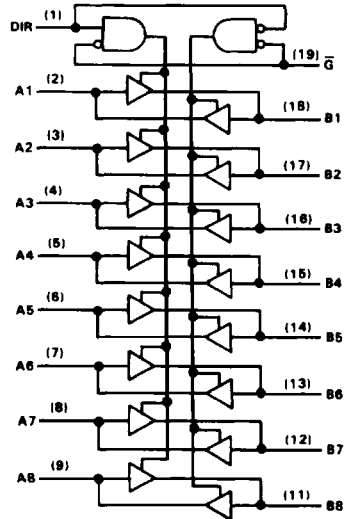
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SN54BCT245, SN74BCT245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

logic symbol†



logic diagram (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, J, and N packages.

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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: SN54BCT245	96 mA
SN74BCT245	128 mA
Operating free-air temperature range: SN54BCT245	-55°C to 125°C
SN74BCT245	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 and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

		SN54BCT245			SN74BCT245			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	A1-A8		-3			-3	mA
		B1-B8		-12			15	mA
I_{OL}	Low-level output current	A1-A8		20			24	mA
		B1-B8		48			64	mA
T_A	Operating free-air temperature	-55		125	0		70	°C

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**SN54BCT245, SN74BCT245
OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS**

electrical characteristics over recommended operating free-air temperature range, $V_{CC} = 5.5\text{ V}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	SN54BCT245			SN74BCT245			UNIT	
		MIN	TYP†	MAX	MIN	TYP†	MAX		
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_{IK} = -18\text{ mA}$			1.2			-1.2	V	
V_{OH}	Any A	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -1\text{ mA}$	2.5	3.4		2.5	3.4	V
			$I_{OH} = -3\text{ mA}$	2.4	3.3		2.4	3.3	
	Any B		$I_{OH} = -3\text{ mA}$	2.4	3.3		2.4	3.3	
			$I_{OH} = 12\text{ mA}$	2	3.2				
			$I_{OH} = -15\text{ mA}$				2	3.1	
V_{OL}	Any A	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 20\text{ mA}$		0.3	0.5		V	
			$I_{OL} = 24\text{ mA}$				0.35		0.5
	Any B		$I_{OL} = 48\text{ mA}$		0.38	0.55			
			$I_{OL} = 64\text{ mA}$				0.42		0.55
I_{I}^{\ddagger}	A and B	$V_{CC} = 5.5\text{ V}$	$V_{I} = 5.5\text{ V}$			1		1	mA
	DIR and \bar{G}		$V_{I} = 5.5\text{ V}$			0.1		0.1	
I_{IH}^{\ddagger}	A and B	$V_{CC} = 5.5\text{ V}$	$V_{I} = 2.7\text{ V}$			70		70	μA
	DIR and \bar{G}					20		20	
I_{IL}	A and B	$V_{CC} = 5.5\text{ V}$	$V_{I} = 0.5\text{ V}$			-0.65		-0.65	mA
	DIR and \bar{G}					-1.2		-1.2	
I_{OS}^{\S}	Any A	$V_{CC} = 5.5\text{ V}$	$V_{O} = 0$			-60		-150	mA
	Any B					100		-225	
I_{CCH}		$V_{CC} = 5.5\text{ V}$	See Note 2			36		57	mA
I_{CCL}		$V_{CC} = 5.5\text{ V}$	See Note 2			57		90	
I_{CCZ}		$V_{CC} = 5.5\text{ V}$				10		15	mA
C_{in}	\bar{G} and DIR					7		7	
C_{IO}	A to B	$V_{CC} = 5.5\text{ V}$	$V_{I} = 2.5\text{ V}$ or 0.5 V			9		9	pF
C_{IO}	B to A						12		

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^{\circ}\text{C}$.

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

NOTE 2: I_{CCH} and I_{CCL} are measured in the A to B mode.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $R_1 = 500\ \Omega$, $R_2 = 500\ \Omega$, $T_A = 25^{\circ}\text{C}$			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_1 = 500\ \Omega$, $R_2 = 500\ \Omega$, $T_A = \text{MIN to MAX}$			UNIT	
			'BCT245			SN54BCT245		SN74BCT245		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
t_{PLH}	A or B	B or A	1	4.4	6	1	7.2	1	7	ns
t_{PHL}			1.5	4.8	6.6	1.5	7.6	1.5	7	
t_{PZH}	\bar{G}	A or B	1.5	8	9.4	1.5	11.2	1.5	10.9	ns
t_{PZL}			1.5	8	10.2	1.5	11.8	1.5	11.6	
t_{PHZ}	\bar{G}	A or B	1.5	5.8	8.3	1.5	9.7	1.5	9.3	ns
t_{PLZ}			1.5	5.1	7.8	1.5	9.6	1.5	9.1	

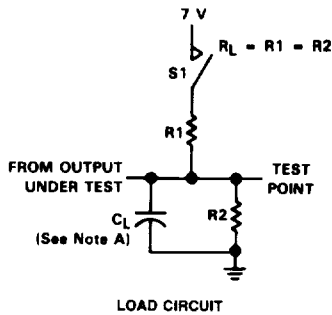


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PARAMETER MEASUREMENT INFORMATION

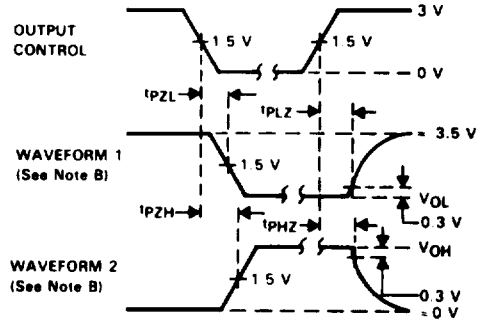
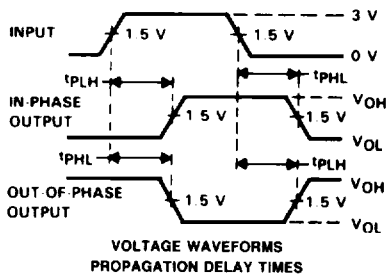


SWITCH POSITION TABLE

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

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- 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.
 D. The outputs are measured one at a time with one input transition per measurement.

FIGURE 1. SWITCHING CHARACTERISTICS