

# SN54HCT623, SN74HCT623 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCLS016B – MARCH 1984 – REVISED MAY 1997

- Inputs Are TTL-Voltage Compatible
- Lock Bus-Latch Capability
- True Logic
- High-Current 3-State Outputs Can Drive up to 15 LSTTL Loads
- Package Options Include Plastic Small-Outline (DW) and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

## description

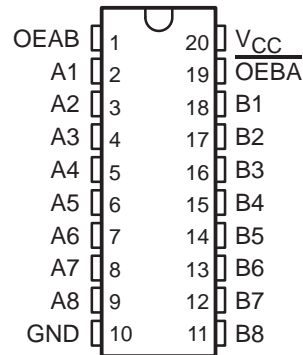
These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation allows for maximum flexibility in timing.

The 'HCT623 allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the output-enable (OEAB and  $\overline{\text{OEBA}}$ ) inputs.

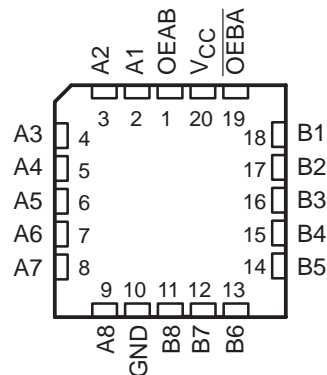
The output-enable inputs disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability to store data by simultaneously enabling OEAB and  $\overline{\text{OEBA}}$ . Each output reinforces its input in this transceiver configuration. When both OEAB and  $\overline{\text{OEBA}}$  are enabled and all other data sources to the two sets of bus lines (16 total) remain at their last states. The 8-bit codes appearing on the two sets of buses are identical.

The SN54HCT623 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HCT623 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

SN54HCT623 . . . J OR W PACKAGE  
SN74HCT623 . . . DW OR N PACKAGE  
(TOP VIEW)



SN54HCT623 . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE

INPUTS		OPERATION
$\overline{\text{OEBA}}$	OEAB	
L	L	B data to A bus
H	H	A data to B bus
H	L	Isolation
L	H	B data to A bus, A data to B bus



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 **TEXAS  
INSTRUMENTS**

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## recommended operating conditions

		SN54HCT623			SN74HCT623			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V		2			2	V
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V		0	0.8		0	V
V <sub>I</sub>	Input voltage	0		V <sub>CC</sub>		0		V <sub>CC</sub>
V <sub>O</sub>	Output voltage	0		V <sub>CC</sub>		0		V <sub>CC</sub>
t <sub>t</sub>	Input transition (rise and fall) time	0		500		0		500
T <sub>A</sub>	Operating free-air temperature	-55		125		-40		85

## 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			SN54HCT623		SN74HCT623		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	4.5 V	4.4	4.499		4.4		4.4	V	
		I <sub>OH</sub> = -6 mA		3.98	4.3		3.7		3.84		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	4.5 V	0.001		0.1	0.1		0.1	V	
		I <sub>OL</sub> = 6 mA		0.17		0.26	0.4		0.33		
I <sub>I</sub>	OEAB or OEBA	V <sub>I</sub> = V <sub>CC</sub> or 0	5.5 V	±0.1		±100	±1000		±1000	nA	
I <sub>OZ</sub>	A or B	V <sub>O</sub> = V <sub>CC</sub> or GND	5.5 V	±0.01		±0.5	±10		±5	μA	
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	5.5 V			8	160		80	μA	
ΔI <sub>CC</sub> †		One input at 0.5 V or 2.4 V, Other inputs at 0 or V <sub>CC</sub>	5.5 V	1.4		2.4	3		2.9	mA	
C <sub>i</sub>	OEAB or OEBA		4.5 V to 5.5 V	3		10	10		10	pF	

† 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<sub>CC</sub>.

## switching characteristics over recommended operating free-air temperature range, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HCT623		SN74HCT623		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	B or A	4.5 V	15		22	33		28		ns
			5.5 V	13		20	30		25		
t <sub>en</sub>	OEBA	A	4.5 V	30		42	63		53		ns
			5.5 V	23		38	57		48		
t <sub>dis</sub>	OEBA	A	4.5 V	18		30	45		38		ns
			5.5 V	16		28	42		35		
t <sub>en</sub>	OEAB	B	4.5 V	30		42	63		53		ns
			5.5 V	23		38	57		48		
t <sub>dis</sub>	OEAB	B	4.5 V	18		30	45		38		ns
			5.5 V	16		28	42		35		
t <sub>t</sub>		A or B	4.5 V	9		12	18		15		ns
			5.5 V	8		11	16		14		

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**SN54HCT623, SN74HCT623**  
**OCTAL BUS TRANSCEIVERS**  
**WITH 3-STATE OUTPUTS**

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switching characteristics over recommended operating free-air temperature range,  $C_L = 150 \text{ pF}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54HCT623		SN74HCT623		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{pd}$	A or B	B or A	4.5 V	18	38	58	47	ns			
			5.5 V	11	34	52	42				
$t_{en}$	$\overline{OEBA}$	A	4.5 V	36	59	89	74	ns			
			5.5 V	30	53	80	67				
	OEAB	B	4.5 V	36	59	89	74				
			5.5 V	30	53	80	67				
$t_t$		A or B	4.5 V	17	42	63	53	ns			
			5.5 V	14	38	57	48				

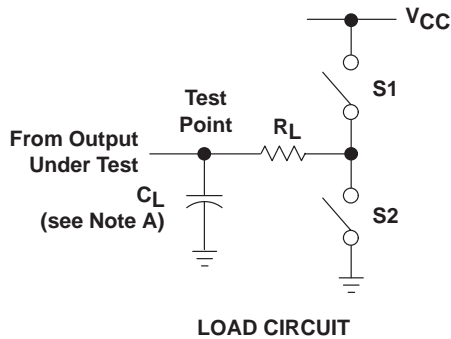
operating characteristics,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance per transceiver	No load	40	pF

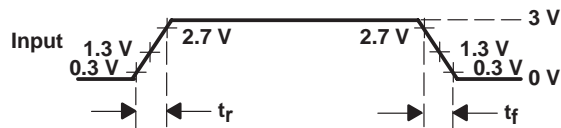
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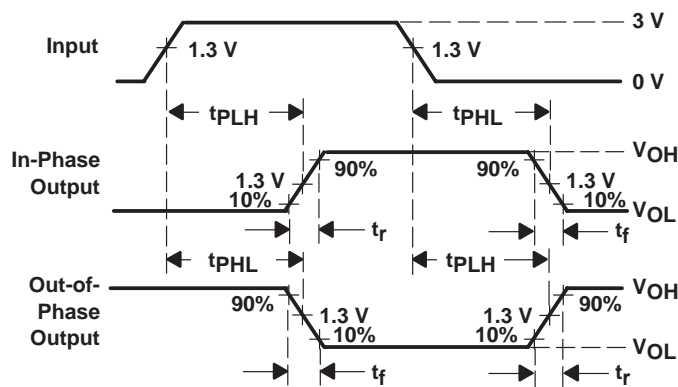
PARAMETER MEASUREMENT INFORMATION



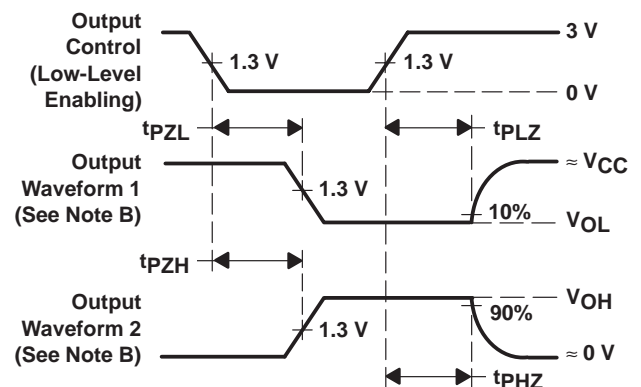
PARAMETER	$R_L$	$C_L$	$S_1$	$S_2$
$t_{en}$	1 k $\Omega$	50 pF or 150 pF	Open	Closed
			Closed	Open
$t_{dis}$	1 k $\Omega$	50 pF	Open	Closed
			Closed	Open
$t_{pd}$ or $t_t$	—	50 pF or 150 pF	Open	Open



VOLTAGE WAVEFORM  
 INPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS  
 PROPAGATION DELAY AND OUTPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS  
 ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

- NOTES: A.  $C_L$  includes probe and test-fixture 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. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.  
 D. The outputs are measured one at a time with one input transition per measurement.  
 E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .  
 F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .  
 G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

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