

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

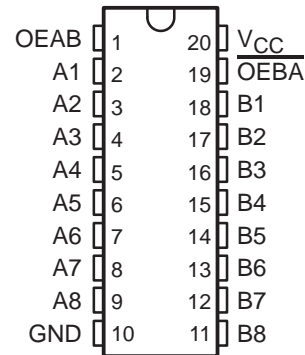
These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation allows for maximum flexibility in timing.

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.

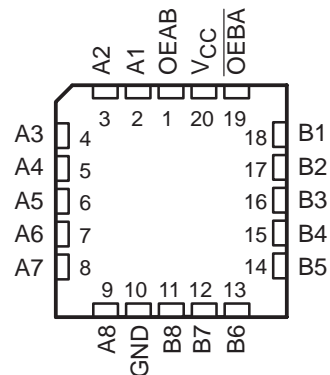
The output-enable inputs disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability to store data by simultaneously enabling OEAB and $\overline{\text{OEBA}}$. Each output reinforces its input in this transceiver configuration. When 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°C to 125°C . The SN74HCT623 is characterized for operation from -40°C to 85°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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SN54HCT623, SN74HCT623 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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recommended operating conditions

| | | SN54HCT623 | | | SN74HCT623 | | | 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 | V _{CC} = 4.5 V to 5.5 V | | 2 | | | 2 | V | |
| V _{IL} | Low-level input voltage | V _{CC} = 4.5 V to 5.5 V | | 0 | 0.8 | | 0 | V | |
| V _I | Input voltage | | | 0 | V _{CC} | | 0 | V | |
| V _O | Output voltage | | | 0 | V _{CC} | | 0 | V | |
| t _t | Input transition (rise and fall) time | | | 0 | 500 | | 0 | ns | |
| T _A | 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 _{CC} | T _A = 25°C | | | SN54HCT623 | | SN74HCT623 | | UNIT |
|--------------------|---|---|-----------------|-----------------------|-------|------|------------|-------|------------|-------|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| V _{OH} | V _I = V _{IH} or V _{IL} | I _{OH} = -20 μA | 4.5 V | 4.4 | 4.499 | | 4.4 | | 4.4 | V | |
| | | I _{OH} = -6 mA | | 3.98 | 4.3 | | 3.7 | | 3.84 | | |
| V _{OL} | V _I = V _{IH} or V _{IL} | I _{OL} = 20 μA | 4.5 V | | 0.001 | 0.1 | | 0.1 | | V | |
| | | I _{OL} = 6 mA | | | 0.17 | 0.26 | | 0.4 | | | 0.33 |
| I _I | OEAB or OEBA | V _I = V _{CC} or 0 | 5.5 V | | ±0.1 | ±100 | | ±1000 | | ±1000 | nA |
| I _{OZ} | A or B | V _O = V _{CC} or GND | 5.5 V | | ±0.01 | ±0.5 | | ±10 | | ±5 | μA |
| I _{CC} | | V _I = V _{CC} or 0, I _O = 0 | 5.5 V | | | 8 | | 160 | | 80 | μA |
| ΔI _{CC} † | | One input at 0.5 V or 2.4 V, Other inputs at 0 or V _{CC} | 5.5 V | | 1.4 | 2.4 | | 3 | | 2.9 | mA |
| C _i | 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_{CC}.

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V _{CC} | T _A = 25°C | | | SN54HCT623 | | SN74HCT623 | | UNIT |
|------------------|--------------------------|-------------|-----------------|-----------------------|-----|-----|------------|-----|------------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| t _{pd} | A or B | B or A | 4.5 V | | 15 | 22 | | 33 | | 28 | ns |
| | | | 5.5 V | | 13 | 20 | | 30 | | 25 | |
| t _{en} | $\overline{\text{OEBA}}$ | A | 4.5 V | | 30 | 42 | | 63 | | 53 | ns |
| | | | 5.5 V | | 23 | 38 | | 57 | | 48 | |
| t _{dis} | $\overline{\text{OEBA}}$ | A | 4.5 V | | 18 | 30 | | 45 | | 38 | ns |
| | | | 5.5 V | | 16 | 28 | | 42 | | 35 | |
| t _{en} | OEAB | B | 4.5 V | | 30 | 42 | | 63 | | 53 | ns |
| | | | 5.5 V | | 23 | 38 | | 57 | | 48 | |
| t _{dis} | OEAB | B | 4.5 V | | 18 | 30 | | 45 | | 38 | ns |
| | | | 5.5 V | | 16 | 28 | | 42 | | 35 | |
| t _t | | A or B | 4.5 V | | 9 | 12 | | 18 | | 15 | ns |
| | | | 5.5 V | | 8 | 11 | | 16 | | 14 | |

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

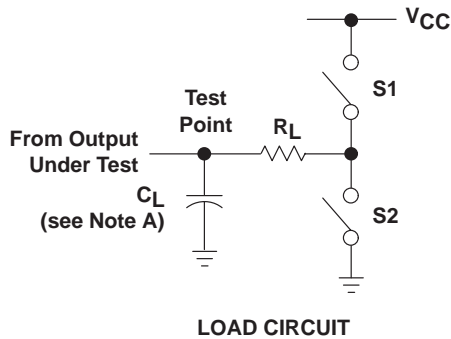
| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|--|-----------------|-----|------|
| C_{pd} Power dissipation capacitance per transceiver | No load | 40 | pF |

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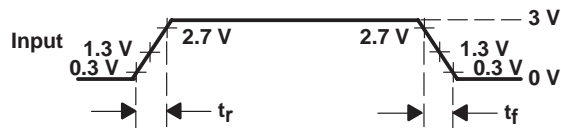


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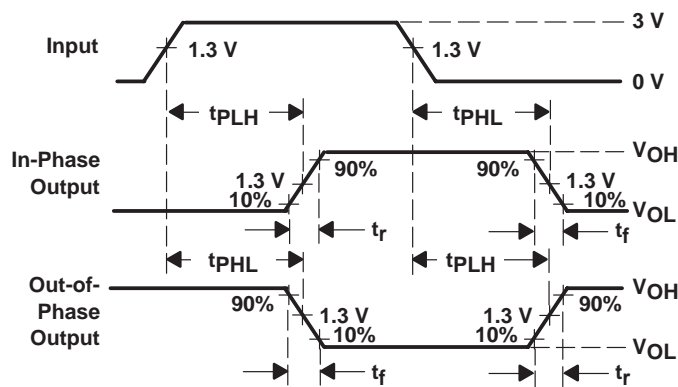
PARAMETER MEASUREMENT INFORMATION



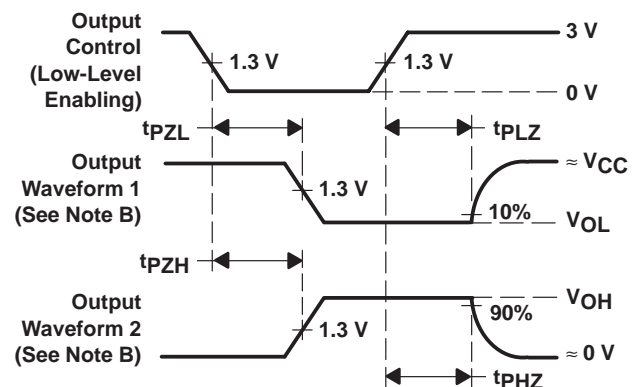
| PARAMETER | | R_L | C_L | S_1 | S_2 |
|-------------------|-----------|--------------|-----------------|--------|--------|
| t_{en} | t_{pZH} | 1 k Ω | 50 pF or 150 pF | Open | Closed |
| | t_{pZL} | | | Closed | Open |
| t_{dis} | t_{pHZ} | 1 k Ω | 50 pF | Open | Closed |
| | t_{pLZ} | | | Closed | 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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