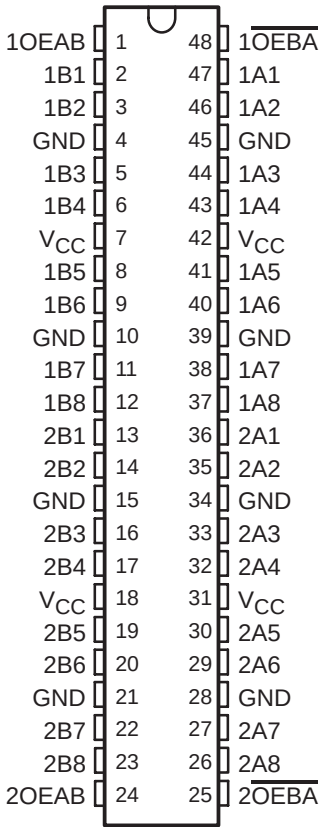
- **Member of the Texas Instruments *Widebus*™ Family**
- **Packaged in Plastic 300-mil Shrink Small-Outline Package Using 25-mil Center-to-Center Pin Spacings**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**

DL PACKAGE
(TOP VIEW)



description

The 74AC16623 is a 16-bit transceiver designed for asynchronous communication between data buses. The control function implementation allows for maximum flexibility in timing.

This device can be used as two 8-bit transceivers or one 16-bit transceiver. It allows 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 output-enable ($\overline{OEBA}$ and OEAB) inputs. The output-enable inputs can be used to disable the device so that the buses are effectively isolated.

The dual-enable configuration gives the bus transceiver the capability to store data by simultaneous enabling of $\overline{OEBA}$ and OEAB. Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled and all other data sources to the two sets of bus lines are at high impedance, the bus lines will remain at their last states.

The 74AC16623 is packaged in TI's shrink small-outline package (DL), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The 74AC16623 is characterized for operation from −40°C to 85°C.

FUNCTION TABLE
(each 8-bit section)

INPUTS		OPERATION
$\overline{OEBA}$	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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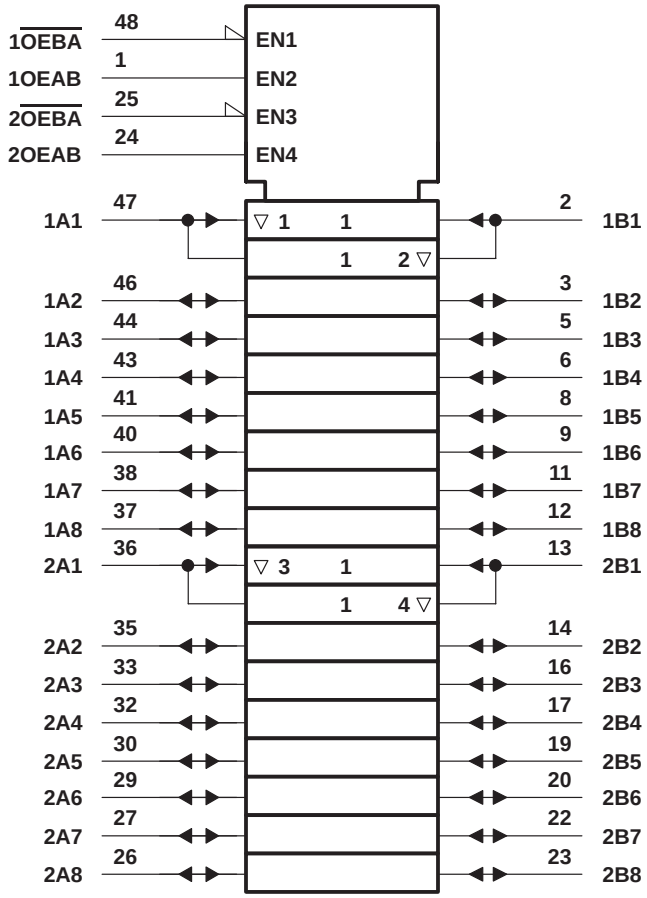
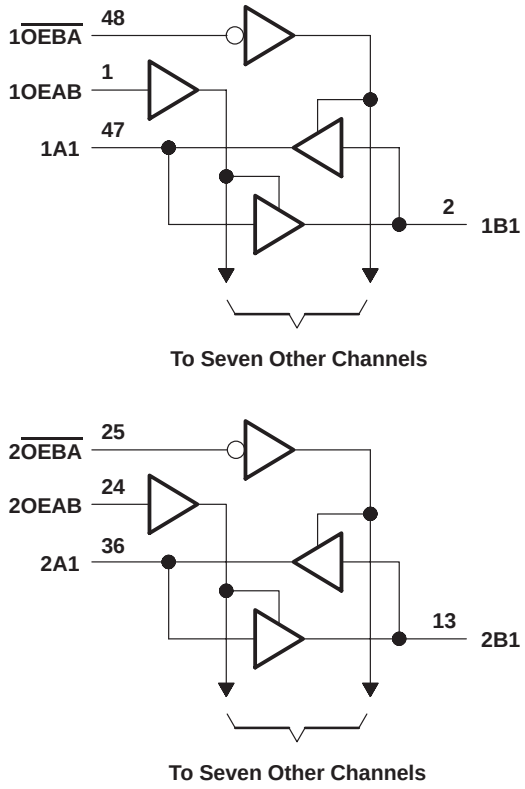
logic symbol†



logic diagram (positive logic)



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

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})	±20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC})	±50 mA
Continuous output current, I_O (V_O = 0 to V_{CC})	±50 mA
Continuous current through V_{CC} or GND	±400 mA
Maximum power package dissipation at T_A = 55°C (in still air)	0.85 W
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 clamp-current ratings are observed.

recommended operating conditions (see Note 2)

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		3	5	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 3 V	2.1			V
		V_{CC} = 4.5 V	3.15			
		V_{CC} = 5.5 V	3.85			
V_{IL}	Low-level input voltage	V_{CC} = 3 V			0.9	V
		V_{CC} = 4.5 V			1.35	
		V_{CC} = 5.5 V			1.65	
V_I	Input voltage		0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 3 V			−4	mA
		V_{CC} = 4.5 V			−24	
		V_{CC} = 5.5 V			−24	
I_{OL}	Low-level output current	V_{CC} = 3 V			12	mA
		V_{CC} = 4.5 V			24	
		V_{CC} = 5.5 V			24	
$\Delta t/\Delta v$	Input transition rise or fall rate		0		10	ns/V
T_A	Operating free-air temperature		−40		85	°C

NOTE 2: Unused or floating pins (input or I/O) must be held high or low.

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

PARAMETER		TEST CONDITIONS	V_{CC}	TA = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
V_{OH}		I_{OH} = − 50 µA	3 V	2.9			2.9		V
			4.5 V	4.4			4.4		
			5.5 V	5.4			5.4		
		I_{OH} = − 4 mA	3 V	2.58			2.48		
		I_{OL} = − 24 mA	4.5 V	3.94			3.8		
			5.5 V	4.94			4.8		
		I_{OH} = −75 mA†	5.5 V				3.85		
V_{OL}		I_{OL} = 50 µA	3 V			0.1		0.1	V
			4.5 V			0.1		0.1	
			5.5 V			0.1		0.1	
		I_{OL} = 12 mA	3 V			0.36		0.44	
		I_{OL} = 24 mA	4.5 V			0.36		0.44	
			5.5 V			0.36		0.44	
		I_{OL} = 75 mA†	5.5 V					1.65	
I_I	Control inputs	V_I = V_{CC} or GND	5.5 V			±0.1		±1	µA
I_{OZ}‡	A or B ports	V_O = V_{CC} or GND	5.5 V			±0.5		±5	µA
I_{CC}		V_I = V_{CC} or GND, I_O = 0	5.5 V			8		80	µA
C_i	Control inputs	V_I = V_{CC} or GND	5 V		4.5				pF
C_{io}	A or B ports	V_O = V_{CC} or GND	5 V		16				pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.
‡ For I/O ports, the parameter I_{OZ} includes the input leakage current.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t_{PLH}	A or B	B or A	2.7	8.1	10	2.7	11.2	ns
t_{PHL}			3.1	9.3	11.4	3.1	12.5	
t_{PZH}	$\overline{OEBA}$	A	2.7	8.3	10.3	2.7	11.5	ns
t_{PZL}			3.5	11.8	14.2	3.5	15.6	
t_{PHZ}	$\overline{OEBA}$	A	4.8	7.7	9.3	4.8	9.9	ns
t_{PLZ}			4.1	7.5	9.2	4.1	9.8	
t_{PZH}	OEAB	B	2.8	8.1	9.9	2.8	11.1	ns
t_{PZL}			3.8	10.7	14.1	3.8	15.1	
t_{PHZ}	OEAB	B	4.7	7.5	9.1	4.7	9.5	ns
t_{PLZ}			4.3	7.3	8.9	4.3	9.3	

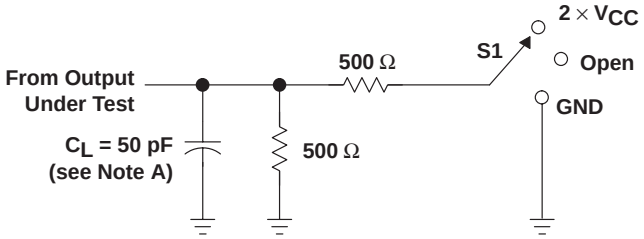
switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
t_{PLH}	A or B	B or A	2.3	5.1	6.9	2.3	7.7	ns
t_{PHL}			2.6	6	7.8	2.6	8.6	
t_{PZH}	$\overline{OEBA}$	A	2.1	5.3	6.8	2.1	7.6	ns
t_{PZL}			2.8	6.9	8.5	2.8	9.4	
t_{PHZ}	$\overline{OEBA}$	A	4.7	6.9	8.4	4.7	8.9	ns
t_{PLZ}			4	6.3	7.7	4	8.2	
t_{PZH}	OEAB	B	2.3	5.2	6.7	2.3	7.5	ns
t_{PZL}			3	6.7	8.4	3	9.3	
t_{PHZ}	OEAB	B	4.5	6.9	8.4	4.5	8.9	ns
t_{PLZ}			4	6.2	7.6	4	7.9	

operating characteristics, V_{CC} = 5 V, T_A = 25°C

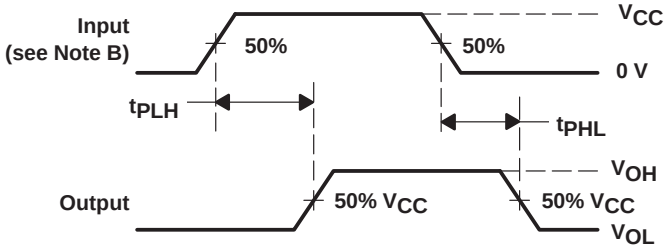
PARAMETER			TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per transceiver	Outputs enabled	C_L = 50 pF, f = 1 MHz	47	pF
		Outputs disabled		8	

PARAMETER MEASUREMENT INFORMATION

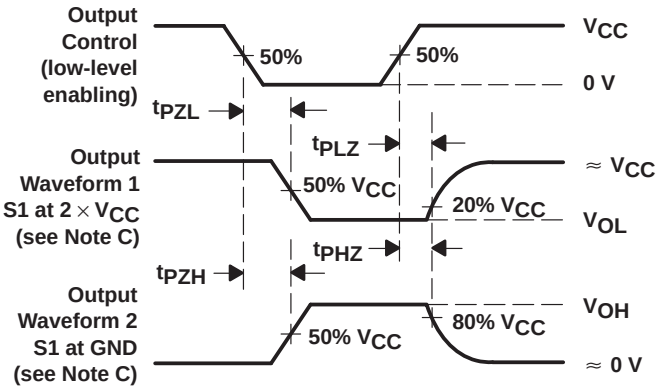


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	2 × V_{CC}
t_{PHZ}/t_{PZH}	GND

LOAD CIRCUIT



VOLTAGE WAVEFORMS



VOLTAGE WAVEFORMS

NOTES: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 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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