- **Member of the Texas Instruments *Widebus +*™ Family**
- **32-Bit Version of QS3245**
- **25-Ω Switch Connection Between Two Ports**
- **TTL-Compatible Input Levels**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Packaged in Plastic Fine-Pitch Ball Grid Array Package**

description

The SN74CBTR32245 device provides 32 bits of high-speed TTL-compatible bus switching. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as four 8-bit bus switches, two 16-bit bus switches, or one 32-bit bus switch. When output enable ($\overline{OE}$) is low, the switch is on, and port A is connected to port B. When $\overline{OE}$ is high, the switch is open, and a high-impedance state exists between the two ports.

The device has equivalent 25-Ω series resistors to reduce signal-reflection noise. This eliminates the need for external terminating resistors.

The SN74CBTR32245 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each 8-bit bus switch)

INPUT $\overline{OE}$	FUNCTION
L	A port = B port
H	Disconnect

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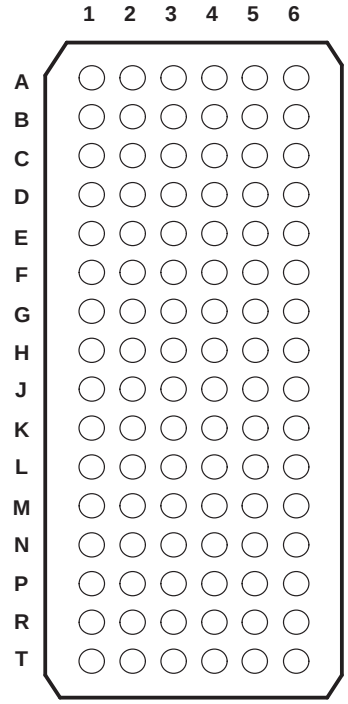
GKE PACKAGE
(TOP VIEW)

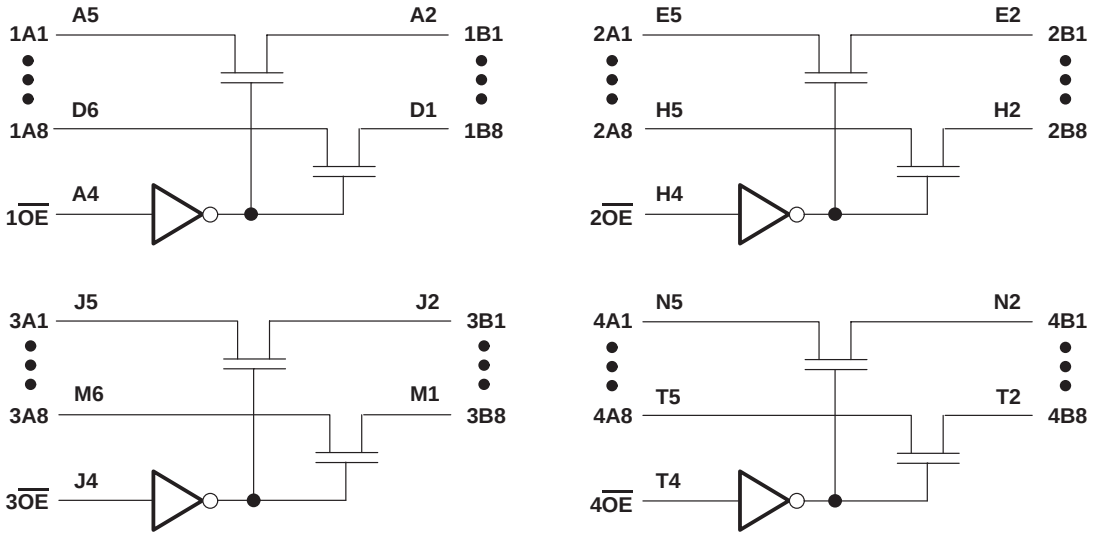


terminal assignments

	1	2	3	4	5	6
A	1B2	1B1	NC	$1\overline{OE}$	1A1	1A2
B	1B4	1B3	GND	GND	1A3	1A4
C	1B6	1B5	V_{CC}	V_{CC}	1A5	1A6
D	1B8	1B7	GND	GND	1A7	1A8
E	2B2	2B1	GND	GND	2A1	2A2
F	2B4	2B3	V_{CC}	V_{CC}	2A3	2A4
G	2B6	2B5	GND	GND	2A5	2A6
H	2B7	2B8	NC	$2\overline{OE}$	2A8	2A7
J	3B2	3B1	NC	$3\overline{OE}$	3A1	3A2
K	3B4	3B3	GND	GND	3A3	3A4
L	3B6	3B5	V_{CC}	V_{CC}	3A5	3A6
M	3B8	3B7	GND	GND	3A7	3A8
N	4B2	4B1	GND	GND	4A1	4A2
P	4B4	4B3	V_{CC}	V_{CC}	4A3	4A4
R	4B6	4B5	GND	GND	4A5	4A6
T	4B7	4B8	NC	$4\overline{OE}$	4A8	4A7

NC – No internal connection

logic diagram (positive logic)



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 7 V
Continuous channel current . . . . . 128 mA
Input clamp current, I_{IK} ($V_{I/O} < 0$) . . . . . –50 mA
Package thermal impedance, θ_{JA} (see Note 2) . . . . . 40°C/W
Storage temperature range, T_{stg} . . . . . –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.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51.

recommended operating conditions (see Note 3)

		MIN	MAX	UNIT
V_{CC}	Supply voltage	4	5.5	V
V_{IH}	High-level control input voltage	2		V
V_{IL}	Low-level control input voltage		0.8	V
T_A	Operating free-air temperature	–40	85	°C

NOTE 3: All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to TI application report *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER		TEST CONDITIONS			MIN	TYP†	MAX	UNIT
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA				–1.2	V
I_I		V_{CC} = 5.5 V,	V_I = 5.5 V or GND				±5	µA
I_{CC}		V_{CC} = 5.5 V,	I_O = 0,	V_I = V_{CC} or GND			50	µA
ΔI_{CC}‡	Control inputs	V_{CC} = 5.5 V,	One input at 3.4 V,	Other inputs at V_{CC} or GND			3.5	mA
C_i	Control inputs	V_I = 3 V or 0						pF
$C_{io(OFF)}$		V_O = 3 V or 0,	$\overline{OE}$ = V_{CC}					pF
r_{on}§		V_{CC} = 4 V, TYP at V_{CC} = 4 V	V_I = 2.4 V,	I_I = 15 mA				Ω
		V_{CC} = 4.5 V	V_I = 0	I_I = 64 mA				
				I_I = 30 mA				
			V_I = 2.4 V,	I_I = 15 mA				

† All typical values are at V_{CC} = 5 V (unless otherwise noted), T_A = 25°C.
‡ This is the increase in supply current for each input that is at the specified TTL-voltage level rather than V_{CC} or GND.
§ Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4 V		V_{CC} = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	
t_{pd}¶	A or B	B or A					ns
t_{en}	$\overline{OE}$	A or B					ns
t_{dis}	$\overline{OE}$	A or B					ns

¶ The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

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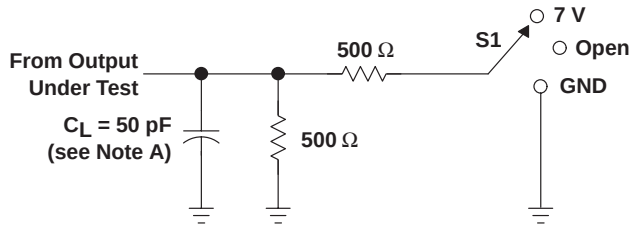
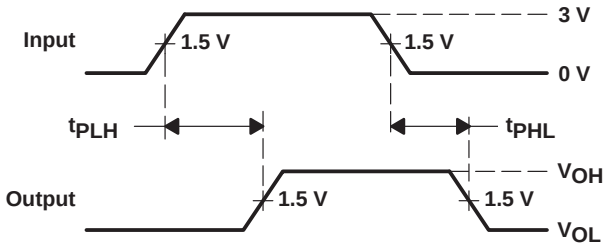
PARAMETER MEASUREMENT INFORMATION

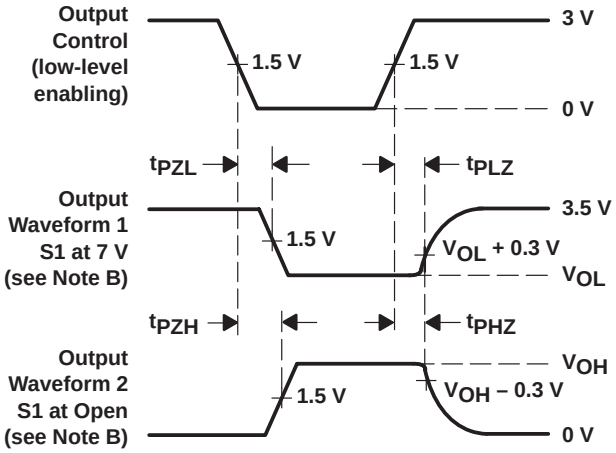


LOAD CIRCUIT

TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

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 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 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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