

SN74CBTR16212 24-BIT FET BUS-EXCHANGE SWITCH

SCDS074A – JULY 1998 – REVISED MAY 2000

- 25-Ω Switch Connection Between Two Ports
- TTL-Compatible Input Levels
- Package Options Include Plastic Thin Shrink Small-Outline (DGG), Thin Very Small-Outline (DGV), and Shrink Small-Outline (DL) Packages

description

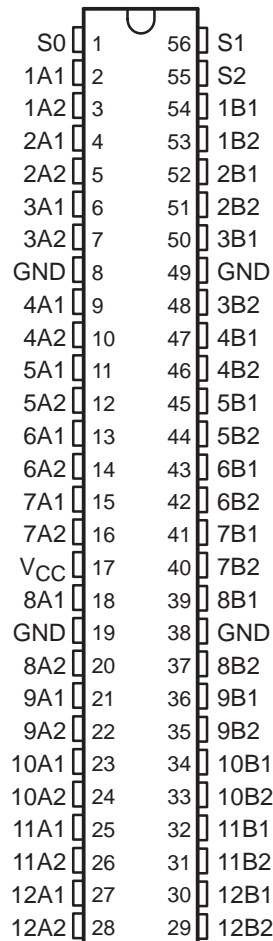
The SN74CBTR16212 provides 24 bits of high-speed TTL-compatible bus switching or exchanging. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device operates as a 24-bit bus switch or as a 12-bit bus exchanger, which provides data exchanging between the four signal ports via the data-select (S0–S2) terminals.

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

The SN74CBTR16212 is characterized for operation from –40°C to 85°C.

DGG, DGV, OR DL PACKAGE
(TOP VIEW)



FUNCTION TABLE

INPUTS			INPUTS/OUTPUTS		FUNCTION
S2	S1	S0	A1	A2	
L	L	L	Z	Z	Disconnect
L	L	H	B1 port	Z	A1 port = B1 port
L	H	L	B2 port	Z	A1 port = B2 port
L	H	H	Z	B1 port	A2 port = B1 port
H	L	L	Z	B2 port	A2 port = B2 port
H	L	H	Z	Z	Disconnect
H	H	L	B1 port	B2 port	A1 port = B1 port A2 port = B2 port
H	H	H	B2 port	B1 port	A1 port = B2 port A2 port = B1 port



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 **TEXAS
INSTRUMENTS**

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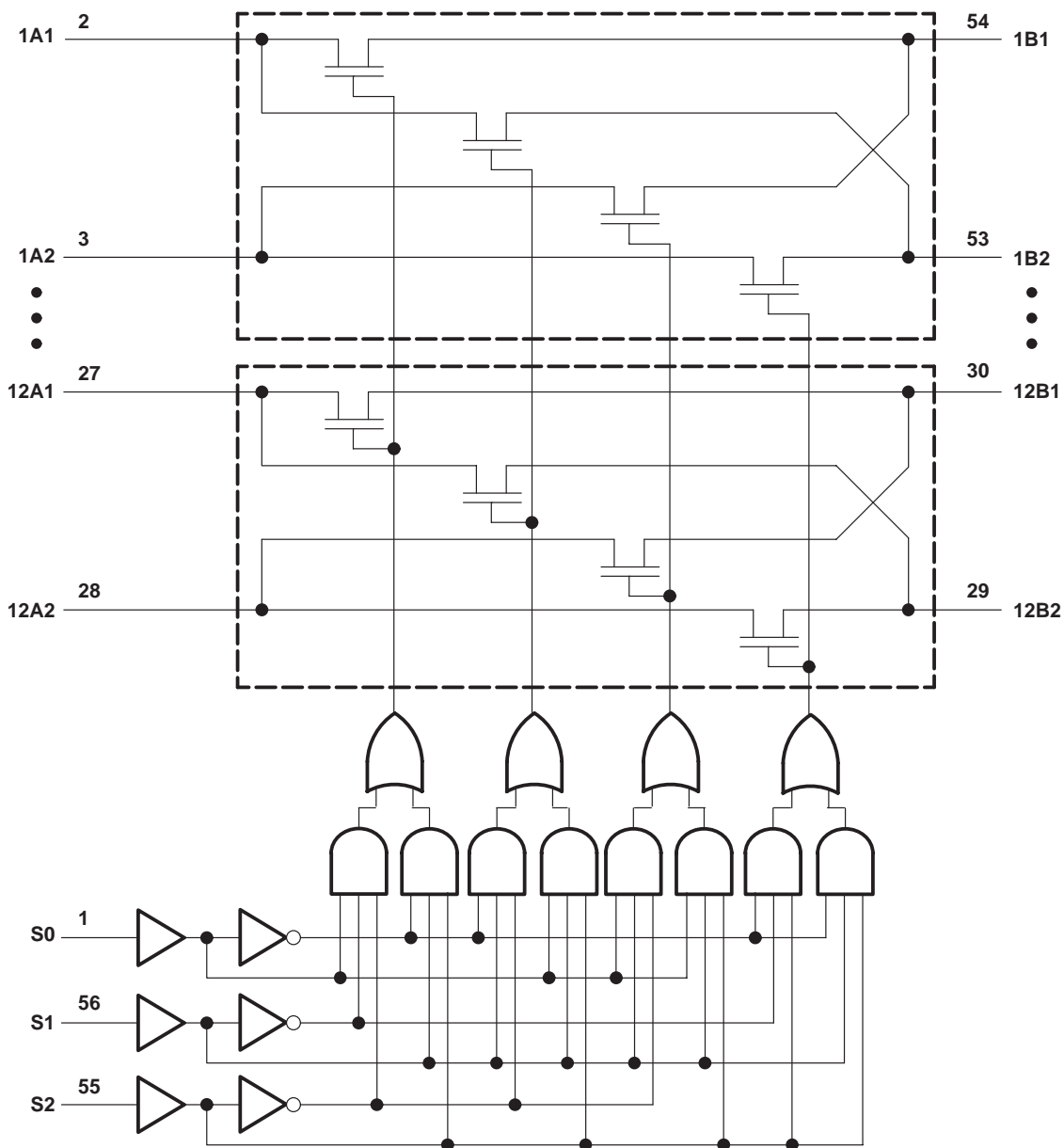
PRODUCT PREVIEW

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24-BIT FET BUS-EXCHANGE SWITCH

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logic diagram (positive logic)



PRODUCT PREVIEW

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} ($V_I < 0$)	–50 mA	
Package thermal impedance, θ_{JA} (see Note 2):	DGG package	64°C/W
	DGV package	48°C/W
	DL package	56°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	5.5	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 the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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	$V_{CC} = 0$, $V_I = 5.5$ V			10	μA
	$V_{CC} = 5.5$ V, $V_I = 5.5$ V or GND			±1	
I_{CC}	$V_{CC} = 5.5$ V, $I_O = 0$, $V_I = V_{CC}$ or GND			3	μA
ΔI_{CC} §	Control inputs $V_{CC} = 5.5$ V, One input at 3.4 V, Other inputs at V_{CC} or GND			2.5	mA
C_i	Control inputs $V_I = 3$ V or 0				pF
$C_{iO(OFF)}$	$V_O = 3$ V or 0, S0, S1, or S2 = V_{CC}				pF
r_{on} ¶	$V_{CC} = 4.5$ V	$V_I = 0$	$I_I = 64$ mA		Ω
			$I_I = 30$ mA		
		$V_I = 2.4$ V, $I_I = 15$ mA			

‡ All typical values are at $V_{CC} = 5$ V (unless otherwise noted), $T_A = 25^\circ\text{C}$.

§ 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.

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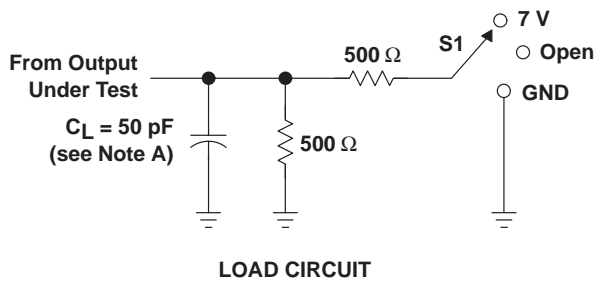
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switching characteristics over recommended operating free-air temperature range, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 1)

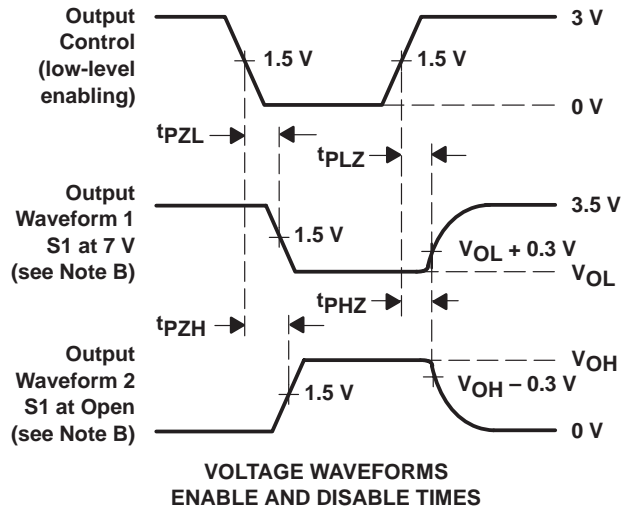
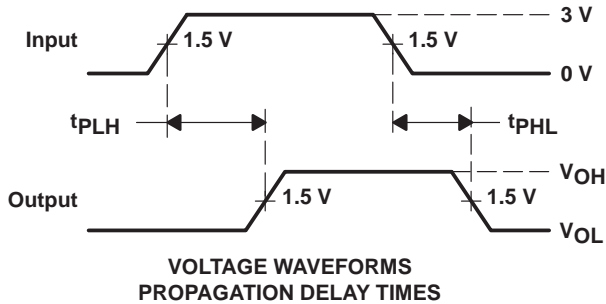
PARAMETER	FROM (INPUT)	TO (OUTPUT)	MIN	MAX	UNIT
t_{pd}^\dagger	A or B	B or A			ns
t_{pd}	S	A or B			ns
t_{en}	S	A or B			ns
t_{dis}	S	A or B			ns

† 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).

PARAMETER MEASUREMENT INFORMATION



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



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 - The outputs are measured one at a time with one transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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