NOVEMBER 1992 – REVISED APRIL 1993

- **5-Ω Switch Connection Between Two Ports**
- **Near-Zero Propagation Delay**
- **TTL-Compatible Input and Output Levels**
- **Packaged in Plastic 300-mil Shrink Small-Outline and Thin Shrink Small-Outline Packages**

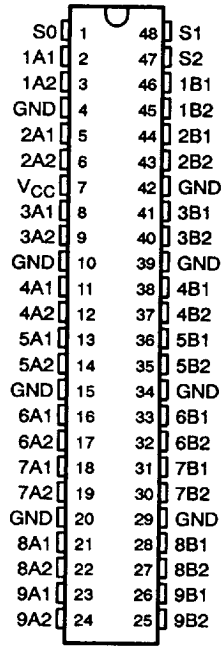
description

The SN74CBT16209 provides 18 bits of high-speed TTL-compatible bus switching or exchanging. The low on-state resistance of the switch allows bidirectional connections to be made while adding near-zero propagation delay.

The device operates as an 18-bit bus switch or a 9-bit bus exchanger, which provides data exchanging between the four signal ports using the data-select inputs (S0–S2).

The SN74CBT16209 is characterized for operation from –40°C to 85°C.

DGG OR DL PACKAGE
(TOP VIEW)



FUNCTION TABLE

FLOW CONTROL			OUTPUTS		FUNCTION
S0	S1	S2	A1	A2	
L	L	L	Z	Z	Disconnect
H	L	L	Z	B2	A2 to B2
L	H	L	B2	Z	A1 to B2
H	H	L	B1	B2	A1 to B1, A2 to B2
L	L	H	B1	Z	A1 to B1
H	L	H	Z	Z	Disconnect
L	H	H	Z	B1	A2 to B1
H	H	H	B2	B1	A1 to B2, A2 to B1

PRODUCT PREVIEW

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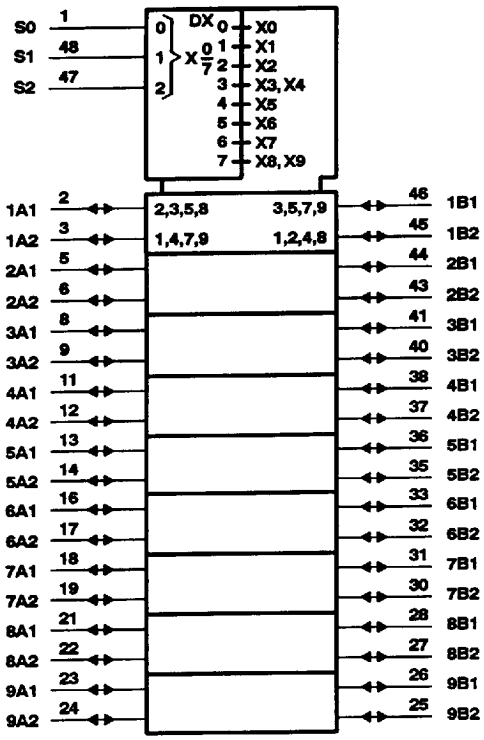
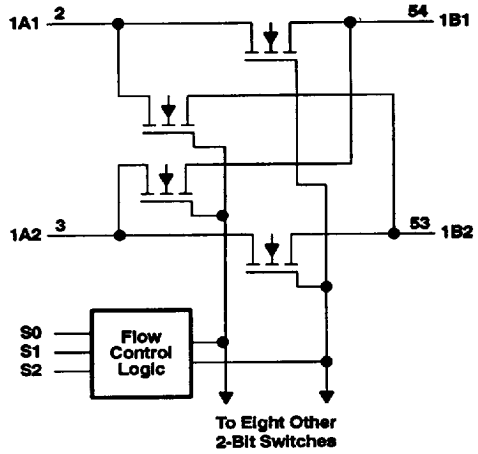
logic symbol†



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

logic diagram



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
Current into any pin, I_O ..... 128 mA
Input clamp current, I_{IK} ($V_I < 0$) ..... −50 mA
Maximum power dissipation at T_A = 55°C (in still air): DGG package ..... 0.6 W
DL package ..... 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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions

		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.5	5.5	V
V_{IH}	High-level input voltage	2		V
V_{IL}	Low-level input voltage		0.8	V
T_A	Operating free-air temperature	−40	85	°C

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_{OS}		V_{CC} = 4.5 V,	$V_{I(A)}$ = 0,	$V_{I(B)}$ = 4.5 V	100			mA
I_{CC}		V_{CC} = 5.5 V,	I_O = 0,	V_I = V_{CC} or GND			1	mA
ΔI_{CC}‡		V_{CC} = 3.6 V,	One input at 2.7 V,	Other inputs at V_{CC} or GND			0.2	mA
C_i	Control pins	V_I = 3 V or 0				4		pF
$C_{o(ON)}$		V_O = 3 V or 0,	Switch on			8		pF
$C_{o(OFF)}$		V_O = 3 V or 0,	Switch off			6		pF
r_{on}§		V_{CC} = 4.5 V,	V_I = 0,	I_I = 64 mA			6	Ω
		V_{CC} = 4.5 V,	V_I = 2.4 V,	I_I = 15 mA			12	

† All typical values are at V_{CC} = 5 V, 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 pin at the indicated current through the switch. On-state resistance (r_{on}) is determined by the lower of the voltages of the two (A or B) pins.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = −40°C TO 85°C		T_A = 0°C TO 70°C		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}¶	A or B	B or A				0.25	ns
t_{PHL}¶						0.25	
t_{PLH}	S0, S1, S2	A or B			1.5	7.5	ns
t_{PHL}					1.5	7.5	
t_{PZH}	S0, S1, S2	A or B			1.5	7.5	ns
t_{PZL}					1.5	7.5	
t_{PHZ}	S0, S1, S2	A or B			1.5	6.5	ns
t_{PLZ}					1.5	6.5	

¶ This parameter is characterized but not tested. This propagation delay is due to the RC delay of the on-state resistance of the switch and the load capacitance.

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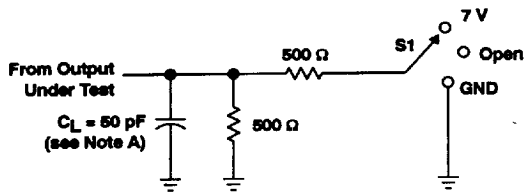
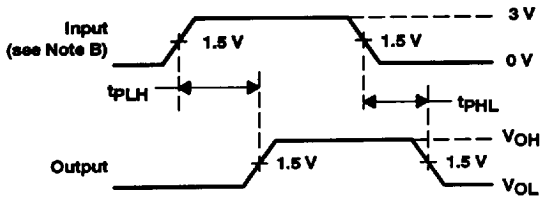
PARAMETER MEASUREMENT INFORMATION

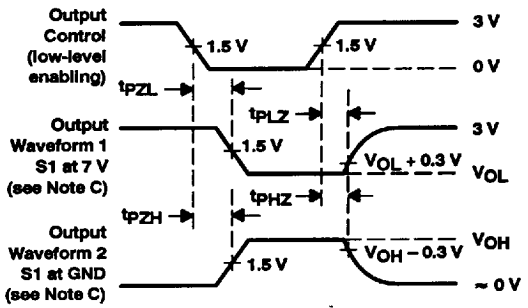


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	GND

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 ≤ 2.5 ns, t_f ≤ 2.5 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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