SCDS006G – NOVEMBER 1992 – REVISED JUNE 1996

- **5-Ω Switch Connection Between Two Ports**
- **TTL-Compatible Input and Output Levels**
- **Package Options Include Plastic Thin Shrink Small-Outline (DGG), 300-mil Shrink Small-Outline (DL), and 380-mil Fine-Pitch Ceramic Flat (WD) Packages**

description

The ’CBT16209 provide 18 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.

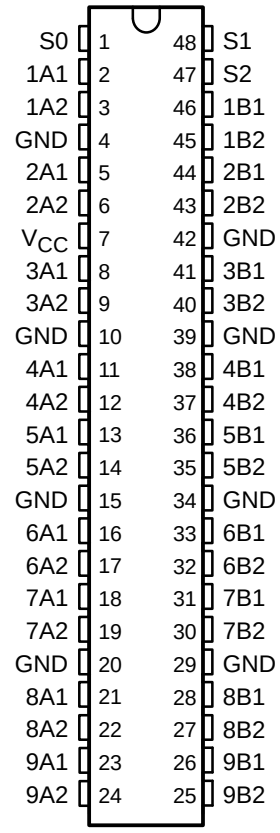
The devices operate as an 18-bit bus switch or a 9-bit bus exchanger, which provides data exchanging between the four signal ports via the data-select (S0–S2) terminals.

The SN54CBT16209 is characterized for operation from –55°C to 125°C. The SN74CBT16209 is characterized for operation from –40°C to 85°C.

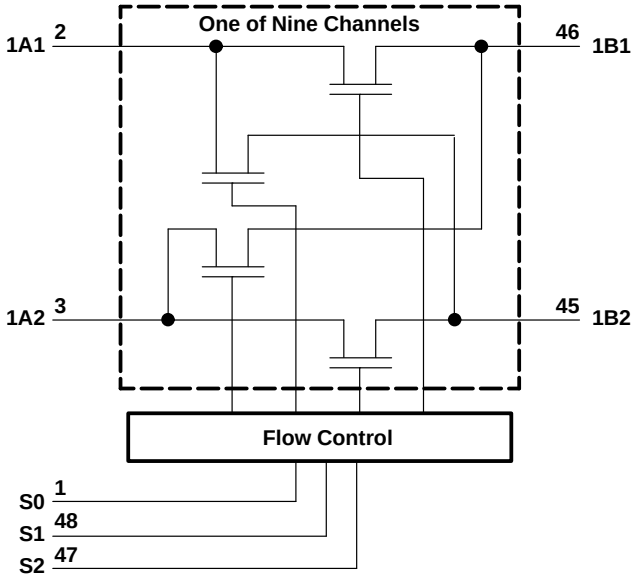
FUNCTION TABLE

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

SN54CBT16209 . . . WD PACKAGE
SN74CBT16209 . . . DGG OR DL PACKAGE
(TOP VIEW)



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
Continuous channel current . . . . . 128 mA
Input clamp current, I_{IK} ($V_I < 0$) . . . . . –50 mA
Maximum power dissipation at T_A = 55°C (in still air) (see Note 2): DGG package . . . . . 0.85 W
DL package . . . . . 1.2 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils. For more information, refer to the *Package Thermal Considerations* application note in the *ABT Advanced BiCMOS Technology Data Book*.

recommended operating conditions

		SN54CBT16209		SN74CBT16209		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4	5.5	4	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
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			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 pins	V_{CC} = 5.5 V,	One input at 3.4 V,	Other inputs at V_{CC} or GND			2.5	mA
C_i	Control pins	V_I = 3 V or 0				4		pF
$C_{io(OFF)}$		V_O = 3 V or 0,	S0, S1, or S2 = V_{CC}			7.5		pF
r_{on}§		V_{CC} = 4.5 V	V_I = 0,	I_I = 64 mA		4	8	Ω
			V_I = 0,	I_I = 30 mA		4	8	
			V_I = 2.4 V,	I_I = 15 mA		6	15	

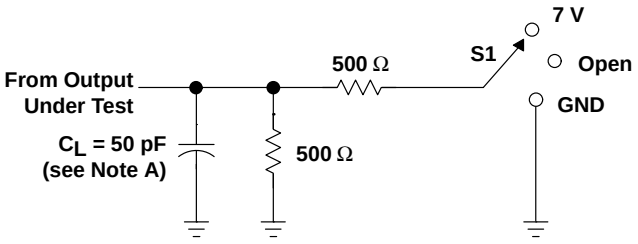
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.
§ Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance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

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54CBT16209				SN74CBT16209				UNIT
			V_{CC} = 5 V ± 0.5 V		V_{CC} = 4 V		V_{CC} = 5 V ± 0.5 V		V_{CC} = 4 V		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{pd}¶	A or B	B or A		0.8				0.25		0.25	ns
t_{pd}	S		2	13.1		14	2.6	10.2		11.3	
t_{en}	S	A or B	1.7	15.3		16	2.7	10.6		11.5	ns
t_{dis}	S	A or B	1	13.2		14.5	1.2	11.3		12.1	ns

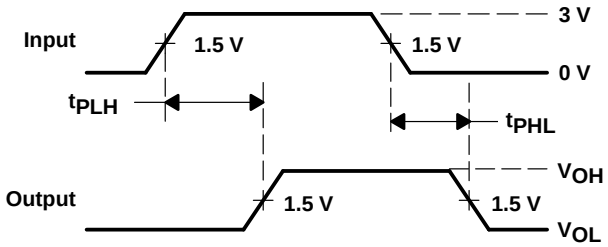
¶ This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical on-state resistance of the switch and a load capacitance of 50 pF, when driven by an ideal voltage source (zero output impedance).

PARAMETER MEASUREMENT INFORMATION

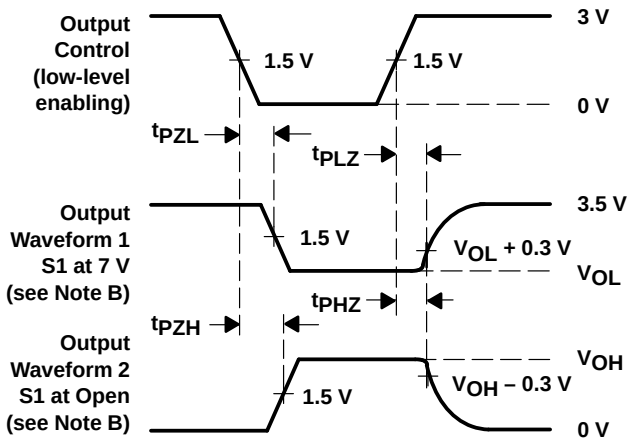


LOAD CIRCUIT

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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