

# SN74CBT16233

## 16-BIT TO 32-BIT FET MULTIPLEXER/DEMULTIPLEXER

SCDS010D – MAY 1995 – REVISED AUGUST 1996

- 5-Ω Switch Connection Between Two Ports
- TTL-Compatible Input and Output Levels
- Package Options Include Plastic Thin Shrink Small-Outline (DGG) and 300-mil Shrink Small-Outline (DL) Packages

### description

The SN74CBT16233 is a 16-bit to 32-bit switch used in applications in which two separate data paths must be multiplexed onto, or demultiplexed from, a single path. This device can be used for memory interleaving, where two different banks of memory need to be addressed simultaneously. The SN74CBT16233 can be used as two 8-bit to 16-bit multiplexers or as one 16-bit to 32-bit multiplexer.

Two select inputs (SEL1 and SEL2) control the data flow. When the TEST inputs are asserted, the A port is connected to both the B1 and the B2 ports. SEL1, SEL2, and the TEST inputs can be driven with a 5-V CMOS, a 5-V TTL, or a low-voltage TTL driver.

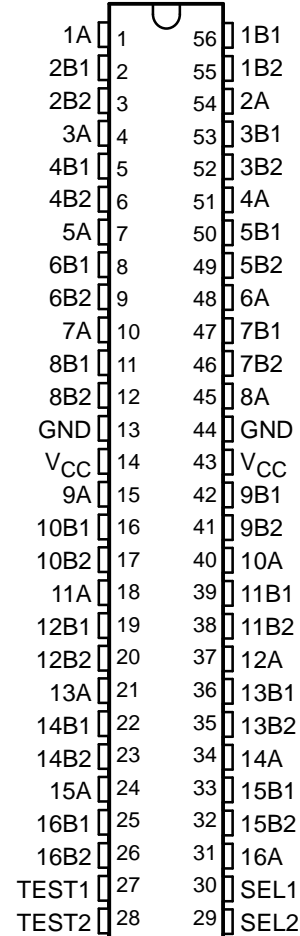
The SN74CBT16233 is specified by design not to have through current when switching directions.

The SN74CBT16233 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS		FUNCTION
SEL	TEST	
L	L	A = B1
H	L	A = B2
X	H	A = B1 and A = B2

DGG OR DL PACKAGE  
(TOP VIEW)



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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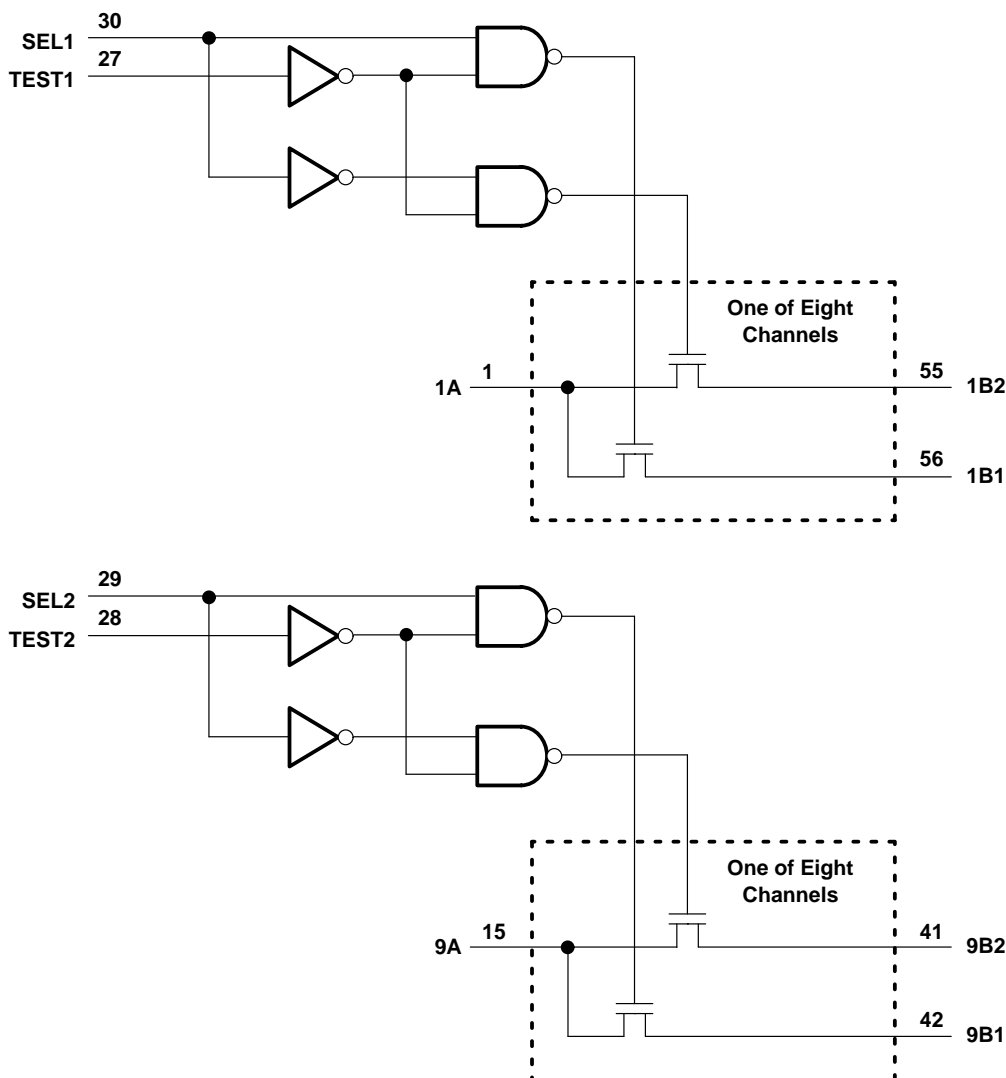
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### logic diagram (positive logic)



### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

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
Continuous channel current	128 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–50 mA
Maximum power package dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2):	
DGG package	1 W
DL package	1.4 W
Storage temperature range, $T_{stg}$	–65°C to 150°C

<sup>†</sup> 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*.



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### recommended operating conditions

		MIN	MAX	UNIT
$V_{CC}$	Supply voltage	4.75	5.25	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	0	70	°C

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

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
$V_{IK}$		$V_{CC} = 4.75$ V,	$I_I = -18$ mA			-1.2	V
$I_I$		$V_{CC} = 0$	$V_I = 5.25$ V			10	μA
		$V_{CC} = 5.25$ V,	$V_I = 5.25$ V or GND			±1	μA
$I_{CC}$		$V_{CC} = 5.25$ V,	$I_O = 0$ , $V_I = V_{CC}$ or GND			3	μA
$\Delta I_{CC}‡$	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				4.5	pF
$C_{io(OFF)}$		$V_O = 3$ V or 0				4	pF
$r_{on}§$		$V_{CC} = 4.75$ V	$V_I = 0$ , $I_I = 64$ mA			5	7
			$V_I = 2.4$ V, $I_I = 30$ mA			5	7
			$V_I = 2.4$ V, $I_I = 15$ mA			7	12

† All typical values are at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$ .

‡ 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 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, 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)	$T_A = 0^\circ\text{C TO } 70^\circ\text{C}$		UNIT
			MIN	MAX	
$t_{pd}¶$	A or B	B or A		0.25	ns
$t_{pd}$	SEL	A	1.6	5.3	ns
$t_{en}$	TEST or SEL	B	1.3	5.2	ns
$t_{dis}$			1	5.3	

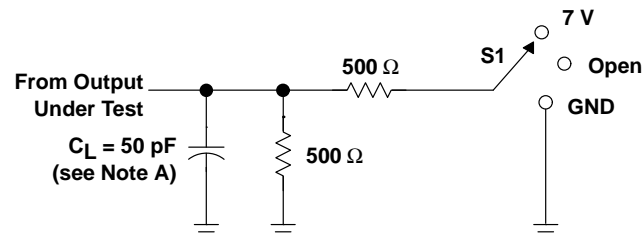
¶ This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical on-state resistance of the switch and a load capacitance of 50 pF, when driven by an ideal voltage source (zero output impedance).

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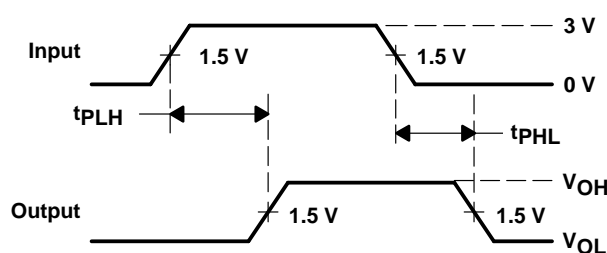
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### PARAMETER MEASUREMENT INFORMATION

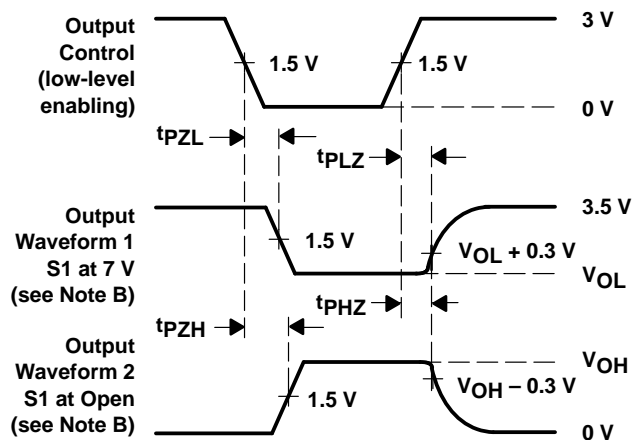


LOAD CIRCUIT

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:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .
  - 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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