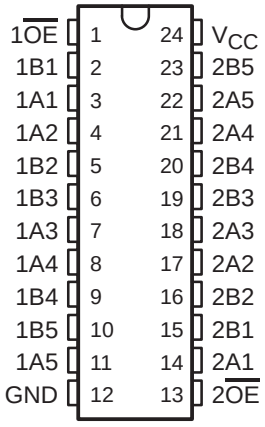
- **5-Ω Switch Connection Between Two Ports**
- **TTL-Compatible Input Levels**

description

The SN74CBTS3384 provides ten bits of high-speed TTL-compatible bus switching with Schottky diodes on the I/Os to clamp undershoot. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

The device is organized as two 5-bit bus switches with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the switch is on, and port A is connected to port B. When $\overline{OE}$ is high, the switch is open and the high-impedance state exists between the two ports.

DB, DBQ, DGV, DW, OR PW PACKAGE
(TOP VIEW)



ORDERING INFORMATION

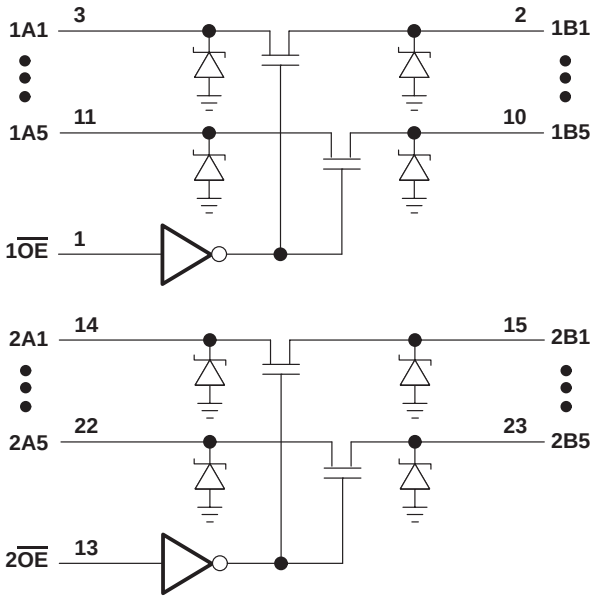
T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	SOIC – DW	Tube	SN74CBTS3384DW	CBTS3384
		Tape and reel	SN74CBTS3384DWR	
	SSOP – DB	Tape and reel	SN74CBTS3384DBR	CR384
	SSOP (QSOP) – DBQ	Tape and reel	SN74CBTS3384DBQR	CBTS3384
	TSSOP – PW	Tape and reel	SN74CBTS384PWR	CR384
	TVSOP – DGV	Tape and reel	SN74CBTS3834DGVR	CR384

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE
(each 5-bit bus switch)

INPUTS		INPUTS/OUTPUTS	
$1\overline{OE}$	$2\overline{OE}$	1B1–1B5	2B1–2B5
L	L	1A1–1A5	2A1–2A5
L	H	1A1–1A5	Z
H	L	Z	2A1–2A5
H	H	Z	Z

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): DB package . . . . . 63°C/W
DBQ package . . . . . 61°C/W
DGV package . . . . . 86°C/W
DW package . . . . . 46°C/W
PW package . . . . . 88°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 51-7.

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 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				–0.6	V
I_I	I_{IL}	V_{CC} = 5.5 V,	V_I = GND				–1	µA
	I_{IH}	V_{CC} = 5.5 V,	V_I = 5.5 V				150	
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				6		pF
$C_{io(OFF)}$		V_O = 3 V or 0,	$\overline{OE}$ = V_{CC}			6.5		pF
r_{on}§		V_{CC} = 4 V, TYP at V_{CC} = 4 V	V_I = 2.4 V,	I_I = 15 mA		14	20	Ω
		V_{CC} = 4.5 V	V_I = 0	I_I = 64 mA		5	7	
				I_I = 30 mA		5	7	
			V_I = 2.4 V,	I_I = 15 mA		10	15	

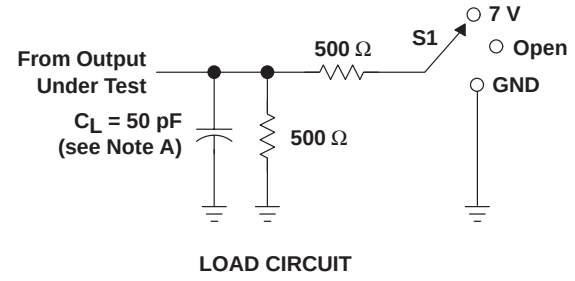
† All typical values are at V_{CC} = 5 V (unless otherwise noted), T_A = 25°C.
‡ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.
§ Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lowest voltage 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)	V_{CC} = 4 V		V_{CC} = 5 V ± 0.5 V		UNIT
			MIN	MAX	MIN	MAX	
t_{pd}¶	A or B	B or A		0.35		0.25	ns
t_{en}	$\overline{OE}$	A or B		6.2	1.9	5.7	ns
t_{dis}	$\overline{OE}$	A or B		5.5	2.1	5.2	ns

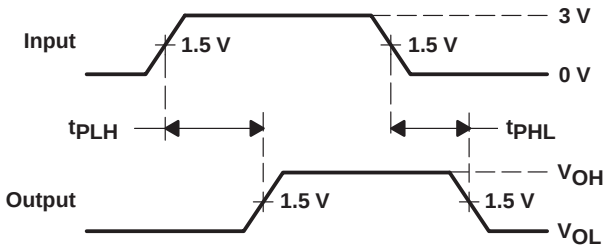
¶ The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

PARAMETER MEASUREMENT INFORMATION

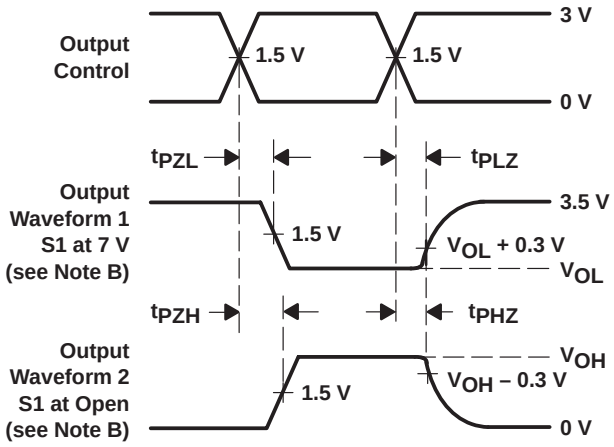


LOAD CIRCUIT

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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PRODUCT FOLDER | PRODUCT INFO: FEATURES | DESCRIPTION | DATASHEETS | PRICING/AVAILABILITY | SAMPLES | APPLICATION NOTES | RELATED DOCUMENTS

PRODUCT SUPPORT: TRAINING

SN74CBTS3384, 10-Bit FET Bus Switch With Schottky Diode Clamping

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN74CBTS3384
Voltage Nodes (V)	4, 5
Vcc range (V)	4.0 to 5.5
No. of Bits	10
ron(max) (ohms)	7
tpd(max) (ns)	0.25

FEATURES

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- 5-Ω Switch Connection Between Two Ports
- TTL-Compatible Input Levels

DESCRIPTION

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The device is organized as two 5-bit bus switches with separate output-enable (OE\) inputs. When OE\ is low, the switch is on, and port A is connected to port B. When OE\ is high, the switch is open and the high-impedance state exists between the two ports.

TECHNICAL DOCUMENTS

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To view the following documents, Acrobat Reader 3.x is required.
To download a document to your hard drive, right-click on the link and choose 'Save'.

DATASHEET

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Full datasheet in Acrobat PDF: scds024j.pdf (72 KB) (Updated: 10/16/2000)
Full datasheet in Zipped PostScript: scds024j.psz (71 KB)

APPLICATION NOTES

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View Application Reports for Digital Logic

- 5-V To 3.3-V Translation With The SN74CBTD3384 (SCDA003B - Updated: 03/01/1997)
- Flexible Voltage-Level Translation With CBT Family Devices (SCDA006 - Updated: 07/20/1999)
- Implications of Slow or Floating CMOS Inputs (SCBA004C - Updated: 02/01/1998)
- Low-Voltage Bus-Switch Technology And Applications (SCDA005 - Updated: 12/01/1997)
- Migration From 3.3-V To 2.5-V Power Supplies For Logic Devices (SCEA005 - Updated: 12/01/1997)
- SN74CBTS3384 Bus Switches Provide Fast Connection And Ensure Isolation (SCDA002A - Updated: 08/01/1996)
- TI Logic Solutions for Memory Interleaving With the Intel440BX Chipset (SCCA001 - Updated: 04/08/1999)
- Texas Instruments Crossbar Switches (SCDA001A - Updated: 06/01/1995)
- Texas Instruments Solution for Undershoot Protection for Bus Switches (SCDA007 - Updated: 04/13/2000)
- Understanding Advanced Bus-Interface Products Design Guide (SCAA029, 253 KB - Updated: 05/01/1996)

RELATED DOCUMENTS

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- Documentation Rules (SAP) And Ordering Information (SZZU001B, 4 KB - Updated: 05/06/1999)
- Logic Selection Guide Second Half 2000 (SDYU001N, 5035 KB - Updated: 04/17/2000)
- MicroStar Junior BGA Design Summary (SCET004, 167 KB - Updated: 07/28/2000)
- More Power In Less Space - Technical Article (SCAU001A, 850 KB - Updated: 03/01/1996)

SAMPLES

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ORDERABLE DEVICE	PACKAGE	PINS	TEMP (°C)	STATUS	SAMPLES
SN74CBTS3384DBQR	DBQ	24	-40 TO 85	ACTIVE	Request Samples
SN74CBTS3384DW	DW	24	-40 TO 85	ACTIVE	Request Samples
SN74CBTS3384PWLE	PW	24	-40 TO 85	OBSOLETE	

PRICING/AVAILABILITY

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ORDERABLE DEVICE	PACKAGE	PINS	TEMP (°C)	STATUS	BUDGETARY PRICE US$/UNIT QTY=1000+	PACK QTY	PRICING/AVAILABILITY
SN74CBTS3384DBLE	DB	24	-40 TO 85	OBSOLETE			
SN74CBTS3384DBQR	DBQ	24	-40 TO 85	ACTIVE	1.34	2500	Check stock or order
SN74CBTS3384DBR	DB	24	-40 TO 85	ACTIVE	1.17	2000	Check stock or order
SN74CBTS3384DGVR	DGV	24		ACTIVE	1.25	2000	Check stock or order
SN74CBTS3384DW	DW	24	-40 TO 85	ACTIVE	1.17	25	Check stock or order
			-40 TO				

SN74CBTS3384DWR	DW	24	85	ACTIVE	1.20	2000	Check stock or order
SN74CBTS3384PWLE	PW	24	-40 TO 85	OBSOLETE			
SN74CBTS3384PWR	PW	24	-40 TO 85	ACTIVE	1.17	2000	Check stock or order

Table Data Updated on: 11/15/2000