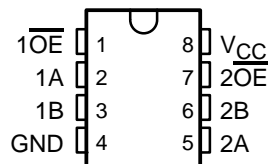


SN74CBTD3306 DUAL BUS SWITCH WITH LEVEL SHIFTING

SCDS030C – JANUARY 1996 – REVISED AUGUST 1996

- 5- Ω Switch Connection Between Two Ports
- TTL-Compatible Control Input Levels
- Designed to Be Used in Level-Shifting Applications
- Package Options Include Plastic Small-Outline (D) and Thin Shrink Small-Outline (PW) Packages

D OR PW PACKAGE
(TOP VIEW)



description

The SN74CBTD3306 features independent line switches. Each switch is disabled when the associated output-enable (\overline{OE}) input is high. A diode to V_{CC} is integrated on the chip to allow for level shifting between 5-V inputs and 3.3-V outputs.

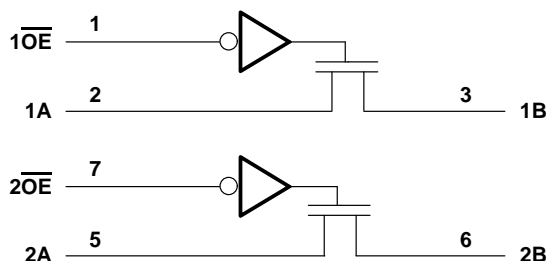
The SN74CBTD3306 is available in TI's thin shrink small-outline (PW) package, which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN74CBTD3306 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE
(each buffer)

INPUTS		OUTPUT B/A
\overline{OE}	A/B	
L	H	H
L	L	L
H	X	Z

logic diagram (positive logic)



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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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SN74CBTD3306

DUAL BUS SWITCH

WITH LEVEL SHIFTING

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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
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): D package	0.8 W
PW package	0.5 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

	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

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

PARAMETER	TEST CONDITIONS	MIN	TYP [‡]	MAX	UNIT
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			–1.2	V
V_{OH}	See Figure 1				
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 5.5\text{ V}$ or GND			±1	μA
I_{CC}	$V_{CC} = 5.5\text{ V}$, $I_O = 0$, $V_I = V_{CC}$ or GND			1.5	μA
ΔI_{CC} [§] Control pins	$V_{CC} = 5.5\text{ V}$, One input at 3.4 V, Other inputs at V_{CC} or GND			2.5	mA
C_i Control pins	$V_I = 3\text{ V}$ or 0			3	pF
$C_{io(OFF)}$	$V_O = 3\text{ V}$ or 0, $\overline{OE} = V_{CC}$			4	pF
r_{on} [¶]	$V_{CC} = 4.5\text{ V}$	$V_I = 0$, $I_I = 64\text{ mA}$	5	7	Ω
		$V_I = 0$, $I_I = 30\text{ mA}$	5	7	
		$V_I = 2.4\text{ V}$, $I_I = 15\text{ mA}$	35	50	

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

[§] 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 the A and B pin at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) pins.



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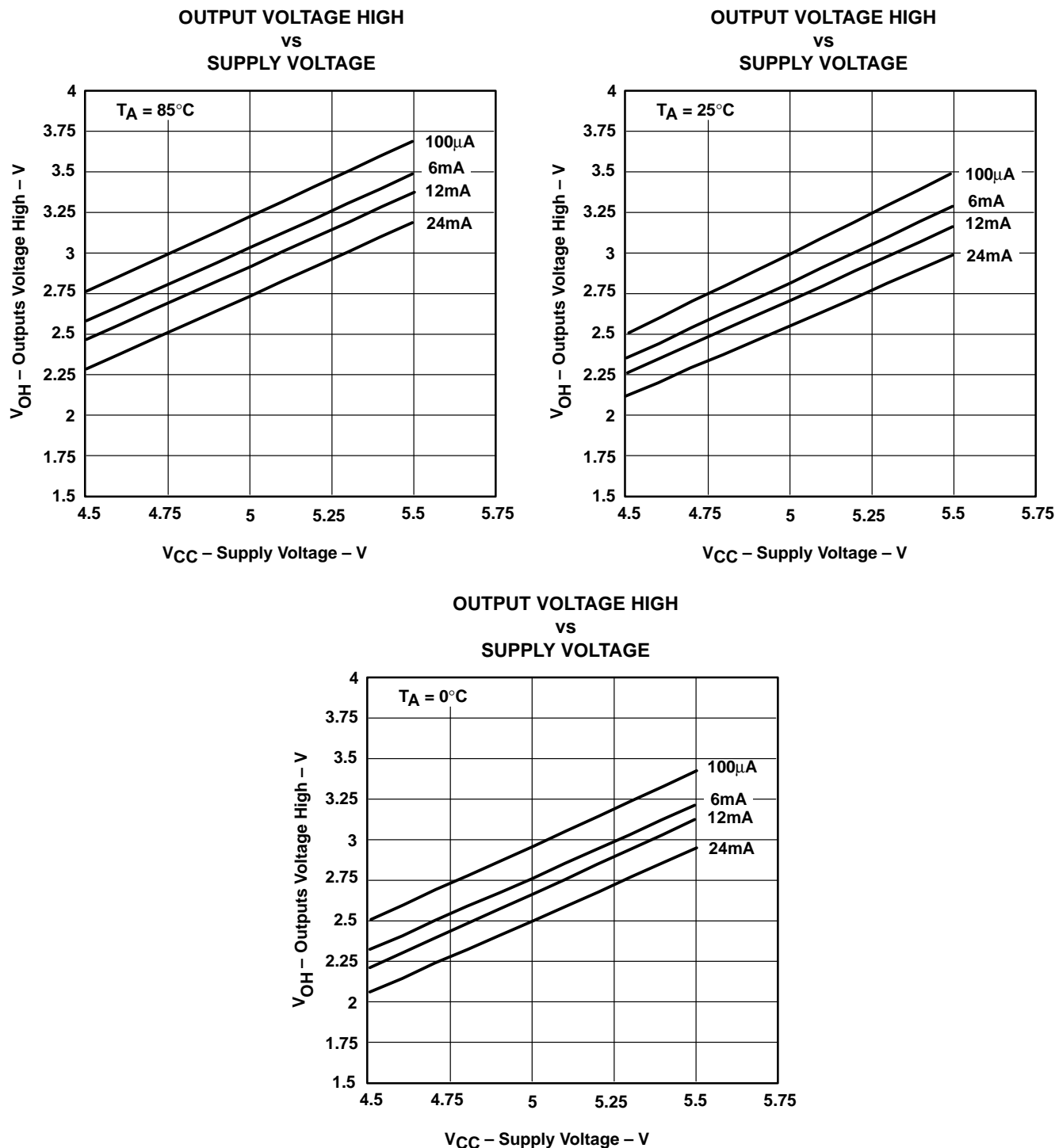


Figure 1. V_{OH} Values

SN74CBTD3306

DUAL BUS SWITCH

WITH LEVEL SHIFTING

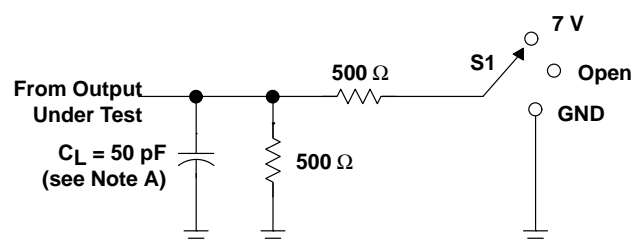
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switching characteristics over recommended ranges of supply voltage and operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	MIN	MAX	UNIT
t_{pd}^\dagger	A or B	B or A		0.25	ns
t_{en}	\overline{OE}	A or B	2.1	5.4	ns
t_{dis}	\overline{OE}	A or B	1	4.7	ns

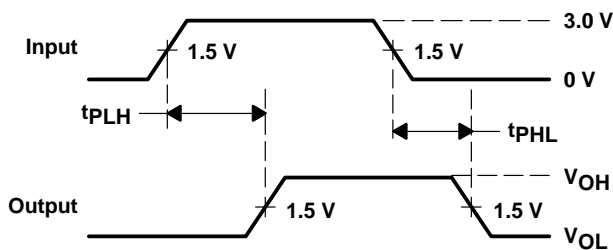
[†] This parameter is warranted but not production tested. The propagation delay is based on the RC time constant of the typical on-state resistance of the switch and a load capacitance of 50 pF, when driven by an ideal voltage source (zero output impedance).

PARAMETER MEASUREMENT INFORMATION

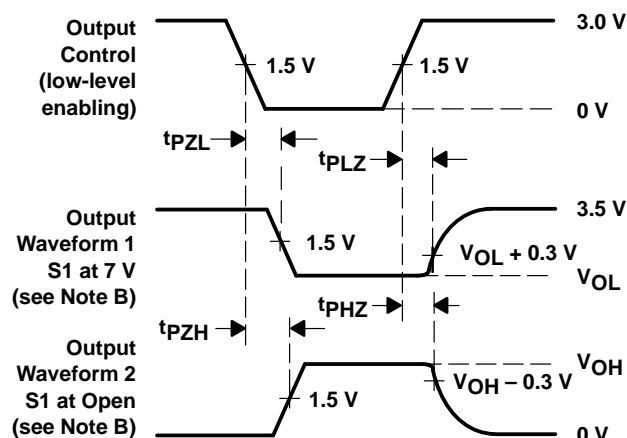


LOAD CIRCUIT

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: $PRR \leq 10$ MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ 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_{PHL} and t_{PLH} are the same as t_{pd} .

Figure 2. Load Circuit and Voltage Waveforms

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