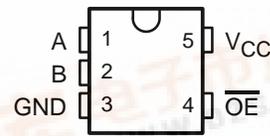


SN74CBTD1G384 SINGLE FET BUS SWITCH WITH LEVEL SHIFTING

SCDS066J – JULY 1998 – REVISED JANUARY 2003

- 5-Ω Switch Connection Between Two Ports
- TTL-Compatible Control Input Levels
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II

DBV OR DCK PACKAGE
(TOP VIEW)



description/ordering information

The SN74CBTD1G384 features a single high-speed line switch. The switch is disabled when the output-enable (\overline{OE}) input is high. A diode to V_{CC} is integrated on the chip to allow for level shifting from 5-V signals at the device inputs to 3.3-V signals at the device outputs.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING‡
-40°C to 85°C	SOT (SOT-23) – DBV	Reel of 3000	SN74CBTD1G384DBVR	P8D_
		Reel of 250	SN74CBTD1G384DBVT	
	SOT (SC-70) – DCK	Reel of 3000	SN74CBTD1G384DCKR	P8_
		Reel of 250	SN74CBTD1G384DCKT	

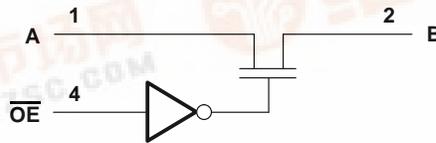
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

‡ The actual top-side marking has one additional character that designates the assembly/test site.

FUNCTION TABLE

INPUT \overline{OE}	FUNCTION
L	A port = B port
H	Disconnect

logic diagram (positive logic)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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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
Package thermal impedance, θ_{JA} (see Note 2): DBV package	206°C/W
DCK package	252°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	5.5	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

In applications with fast edge rates, multiple outputs switching, and operating at high frequencies, the output may have little or no level-shifting effect.

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				–1.2	V
V_{OH}	See Figure 2					
I_I	$V_{CC} = 5.5$ V, $V_I = 5.5$ V or GND				±1	µA
I_{CC}	$V_{CC} = 5.5$ V, $I_O = 0$, $V_I = V_{CC}$ or GND				1.5	mA
ΔI_{CC} §	Control input	$V_{CC} = 5.5$ V, One input at 3.4 V, Other inputs at V_{CC} or GND			2.5	mA
C_i	Control input	$V_I = 3$ V or 0		2		pF
$C_{io(OFF)}$		$V_O = 3$ V or 0, $\overline{OE} = V_{CC}$		3.5		pF
r_{on} ¶	$V_{CC} = 4.5$ V	$V_I = 0$	$I_I = 64$ mA	5	7	Ω
			$I_I = 30$ mA	5	7	
		$V_I = 2.4$ V, $I_I = 15$ mA	35	50		

‡ 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 the A and the 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.

SN74CBTD1G384 SINGLE FET BUS SWITCH WITH LEVEL SHIFTING

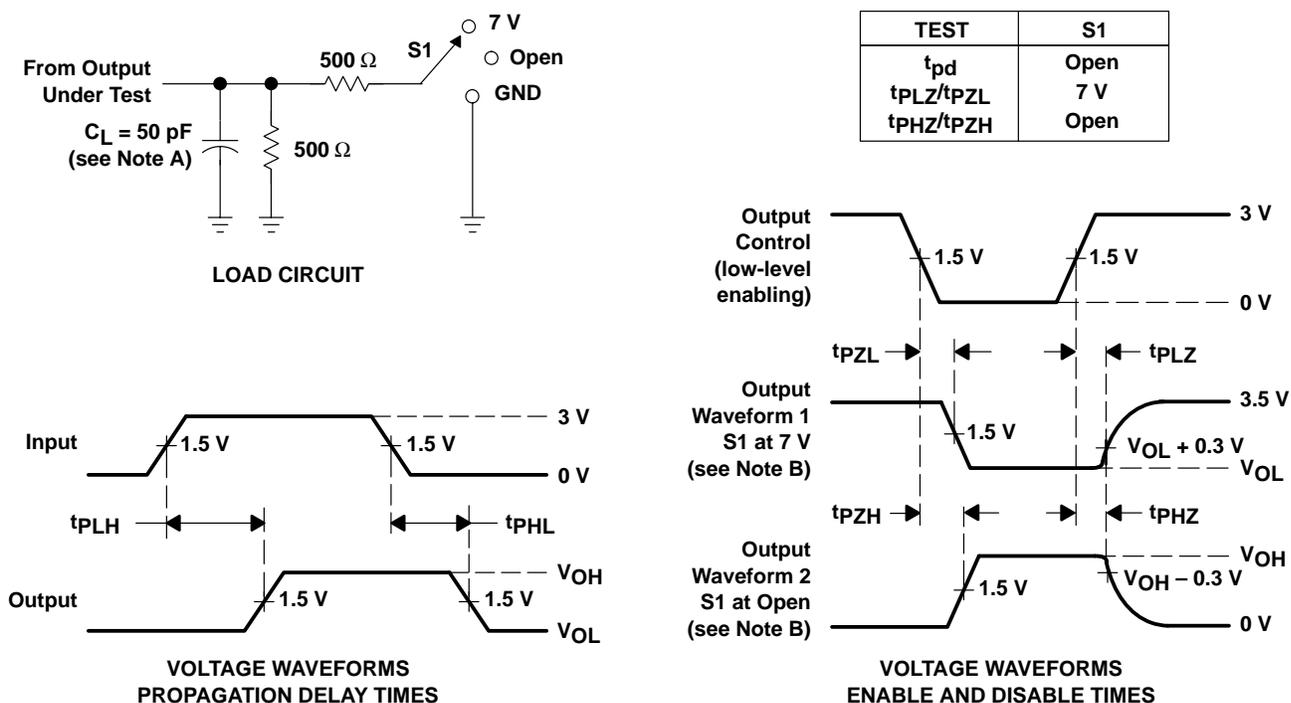
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switching characteristics over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

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	5.9	ns
t_{dis}	\overline{OE}	A or B	1	4.7	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



- 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, $Z_O = 50$ Ω , $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
 - D. The output is measured with one input 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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SINGLE FET BUS SWITCH
WITH LEVEL SHIFTING

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TYPICAL CHARACTERISTICS

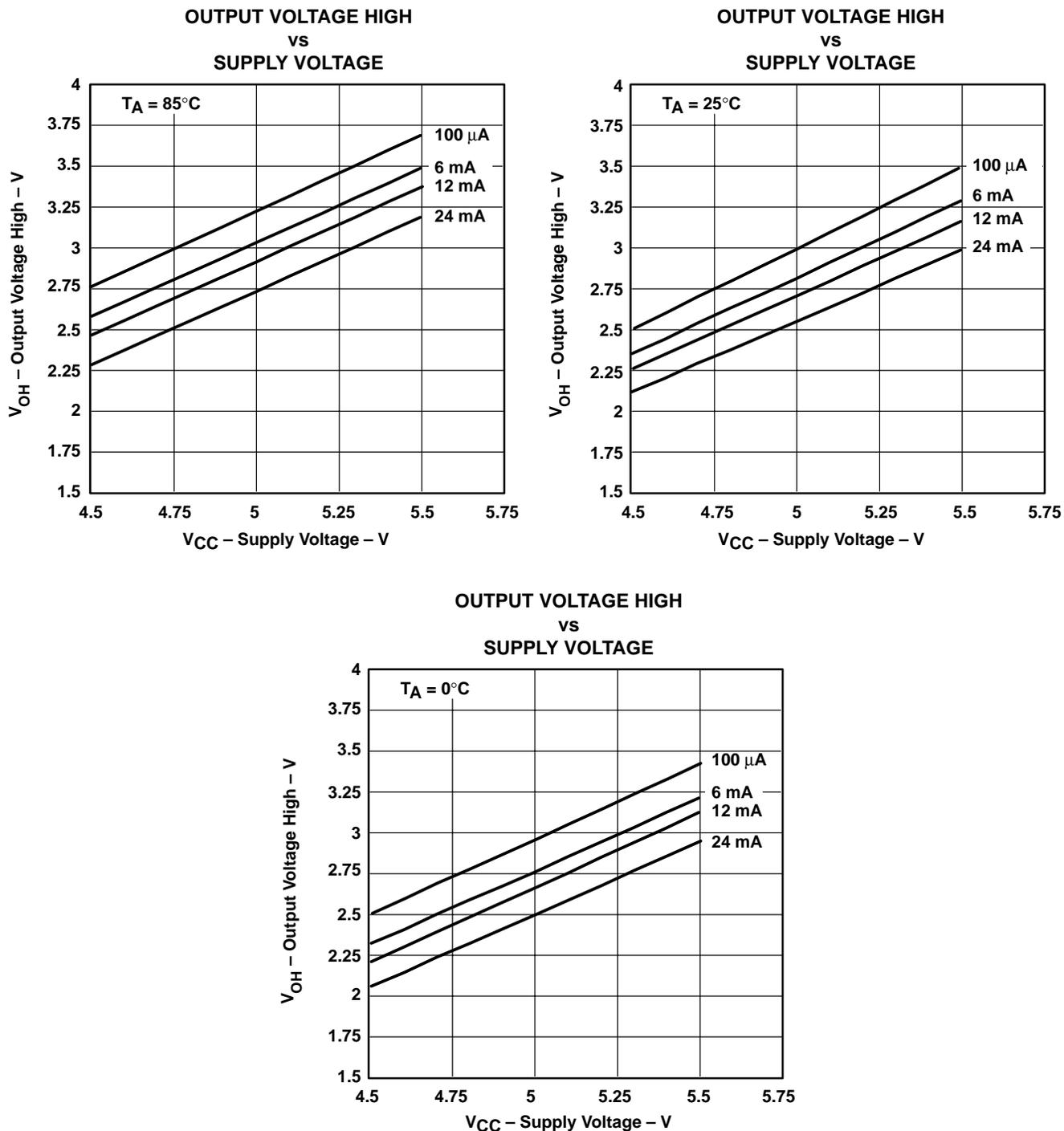


Figure 2. V_{OH} Values

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