LOW-VOLTAGE 10-BIT BUS SWITCH

IDT74CBTLV3384
PRELIMINARY

FEATURES:

- 5Ω A/B bi-directional switch
- Isolation under Power-Off Conditions
- Over-voltage tolerant
- Latch-up performance exceeds 100mA
- VCC = 2.3V - 3.6V, normal range
- ESD > 2000V per MIL-STD-883, Method 3015;
- > 200V using machine model (C = 200pF, R = 0)
- Available in SSOP, QSOP, and TSSOP packages

APPLICATIONS:

- 3.3V High Speed Bus Switching and Bus Isolation

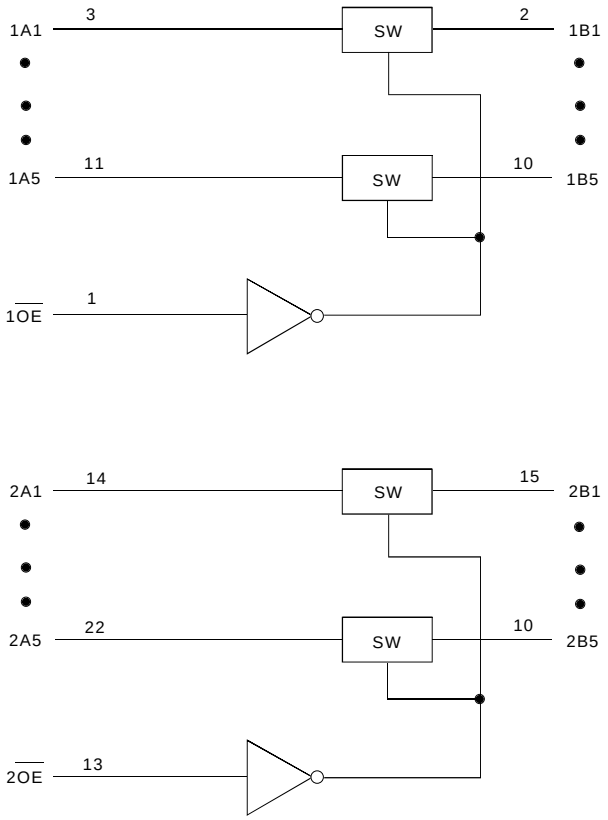
DESCRIPTION:

The CBTLV3384 is a ten bit high-speed bus switch with low on-state resistance of the switch allowing connections to be made with minimal propagation delay.

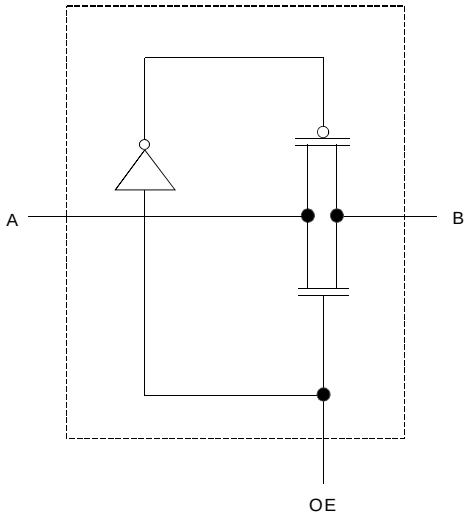
The device is organized as dual 5-bit bus switches with separate output-enable ($\overline{OE}$) inputs, to allow use as two 5-bit bus switches or one 10-bit bus switch. When $\overline{OE}$ is low, the associated 5-bit bus switch is on and A port is connected to B port. When $\overline{OE}$ is high, the switch is open, and a high-impedance state exists between the two ports.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to VCC through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

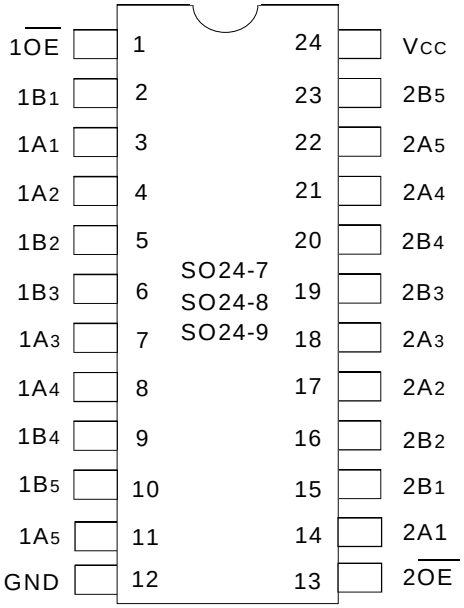
FUNCTIONAL BLOCK DIAGRAM



SIMPLIFIED SCHEMATIC, EACH SWITCH



PIN CONFIGURATION



SSOP/ QSOP/ TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Description	Max.	Unit
V_{CC}	Supply Voltage Range	–0.5 to 4.6	V
V_I	Input Voltage Range	–0.5 to 4.6	V
	Continuous Channel Current	128	mA
I_{IK}	Input Clamp Current, , $V_{I/O} < 0$	–50	mA
T_{STG}	Storage Temperature	–65 to +150	°C

NOTE:
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

FUNCTIONAL TABLE (1)

Inputs		Inputs/Outputs	
$\overline{1OE}$	$\overline{2OE}$	1B1-1B5	2B1-2B5
L	L	1A1-1A5	2A1-2A5
L	H	1A1-1A5	Z
H	L	Z	2A1-2A5
H	H	Z	Z

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care
   Z = High-Impedance

OPERATING CHARACTERISTICS, T_A = 25°C

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{CC}	Supply Voltage		2.3	3.6	V
V_{IH}	High-Level Control Input Voltage	V_{CC} = 2.3V to 2.7V	1.7	—	V
		V_{CC} = 2.7V to 3.6V	2	—	
V_{IL}	Low-Level Control Input Voltage	V_{CC} = 2.3V to 2.7V	—	0.7	V
		V_{CC} = 2.7V to 3.6V	—	0.8	
T_A	Operating Free-Air Temperature		–40	+85	°C

NOTE:
1. All unused control inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Operating Condition: T_A = – 40°C to +85°C

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{IK}	Control Inputs, Data I/O	V_{CC} = 3V, I_I = –18mA		—	—	– 1.2	V
I_I	Control Inputs, Data I/O	V_{CC} = 3.6V, V_I = V_{CC} or GND		—	—	±1	µA
I_{OZ}	Data I/O	V_{CC} = 3.6V, V_O = 0 or 3.6V, switch disabled		—	—	5	µA
I_{OFF}		V_{CC} = 0, V_I or V_O = 0 to 3.6V		—	—	50	µA
I_{CC}		V_{CC} = 3.6V, I_O = 0, V_I = V_{CC} or GND		—	—	10	µA
ΔI_{CC} (1)	Control Inputs	V_{CC} = 3.6V, One input at 3V, Other inputs at V_{CC} or GND		—	—	300	µA
C_I	Control Inputs	V_I = 3V or 0		—	4	—	pF
$C_{IO(OFF)}$		V_O = 3V or 0, $\overline{OE}$ = V_{CC}		—	7	—	pF
R_{ON} (2)	Max at V_{CC} = 2.3V Typ at V_{CC} = 2.5V	V_I = 0	I_O = 64mA	—	5	8	Ω
			I_O = 24mA	—	5	8	
		V_I = 1.7V	I_O = 15mA	—	27	40	
	V_{CC} = 3V	V_I = 0	I_O = 64mA	—	5	7	
			I_O = 24mA	—	5	7	
		V_I = 2.4V	I_O = 15mA	—	10	15	

NOTES:
1. The increase in supply current is attributable to each input that is at the specified voltage level rather than V_{CC} or GND.
2. This is 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

Symbol	Parameter	V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	
t_{PD}(1)	Propagation Delay A to B or B to A	–	0.15	–	0.25	ns
t_{EN}	Output Enable Time $\overline{OE}$ to A or B	1	5	1	4.3	ns
t_{DIS}	Output Disable Time $\overline{OE}$ to A or B	1	5.5	1	5.5	ns

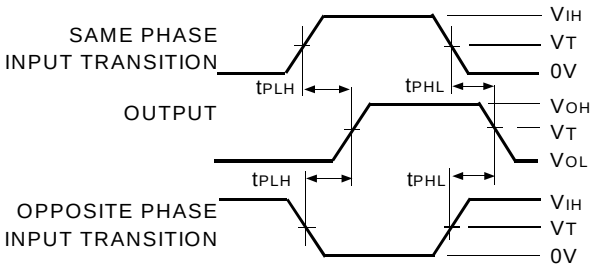
NOTE:
1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance when driven by an ideal voltage source (zero output impedance).

TEST CIRCUITS AND WAVEFORMS

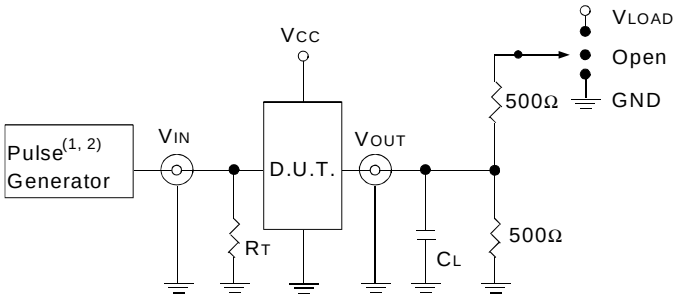
TEST CONDITIONS

Symbol	$V_{CC}^{(1)}$= 3.3V ± 0.3V	$V_{CC}^{(2)}$= 2.5V ± 0.2V	Unit
V_{LOAD}	6	2 x Vcc	V
V_{IH}	3	Vcc	V
V_T	1.5	Vcc/2	V
V_{LZ}	300	150	mV
V_{HZ}	300	150	mV
C_L	50	30	pF

PROPAGATION DELAY



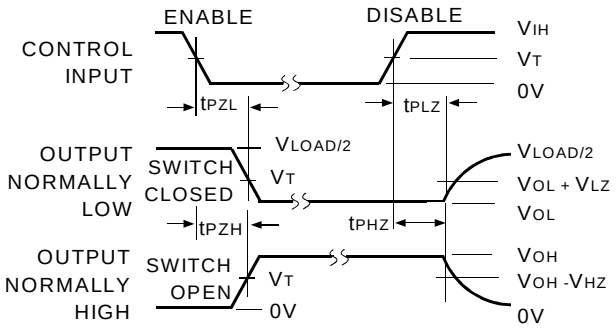
TEST CIRCUITS FOR ALL OUTPUTS



NOTES:
1. Pulse generator for all pulses: Rate ≤ 10MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse generator for all pulses: Rate ≤ 10MHz; t_F ≤ 2ns; t_R ≤ 2ns.

DEFINITIONS:
1. C_L = Load capacitance: includes jig and probe capacitance.
2. R_T = Termination Resistance: Should be equal to Z_{OUT} of the pulse generator.

ENABLE AND DISABLE TIMES

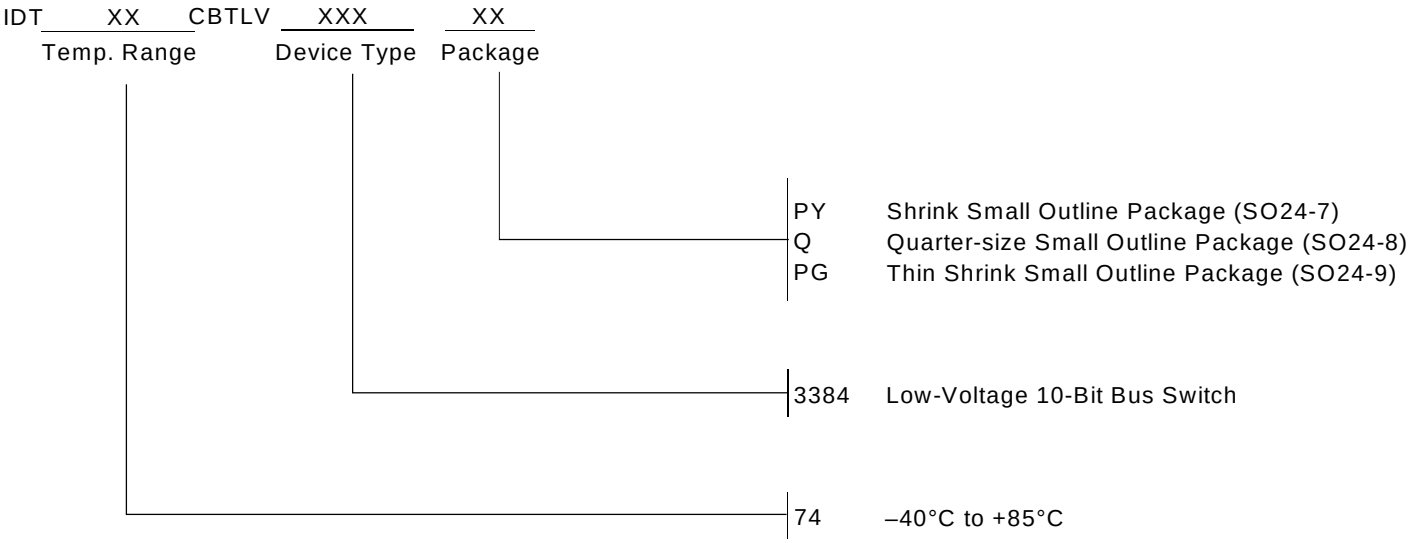


NOTES:
1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

SWITCH POSITION

Test	Switch
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND
t_{PD}	Open

ORDERING INFORMATION



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