LOW-VOLTAGE 10-BIT BUS SWITCH

IDT74CBTLV3384

FEATURES:
- 5Ω A/B bi-directional bus switch
- Isolation under power-off conditions
- Over-voltage tolerant
- Latch-up performance exceeds 100mA
- V_{CC} = 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:
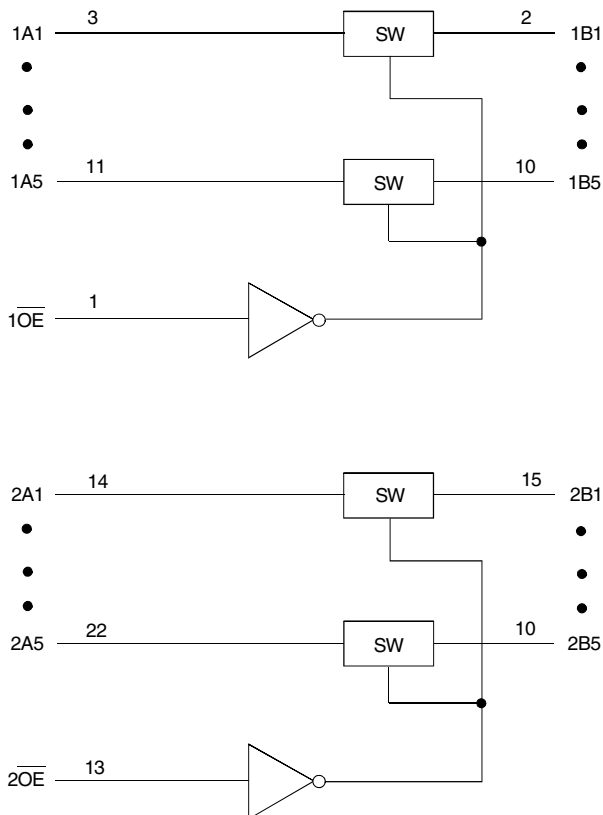- 3.3V High Speed Bus Switching and Bus Isolation

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.
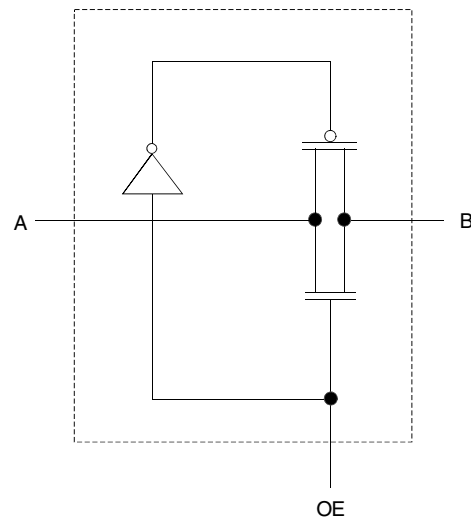
The device is organized as dual 5-bit bus switches with separate output-enable ($\overline{OE}$) inputs, to allow use as two 5-bit bus switches or one 10-bit bus switch. When $\overline{OE}$ is low, the associated 5-bit bus switch is on and A port is connected to B port. When $\overline{OE}$ is high, 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 V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.
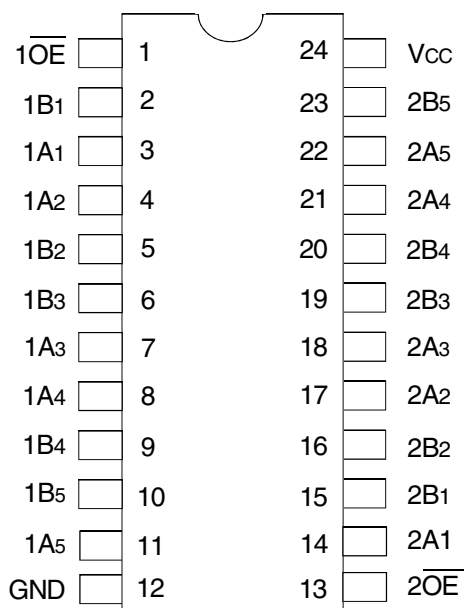
FUNCTIONAL BLOCK DIAGRAM

SIMPLIFIED SCHEMATIC, EACH SWITCH

INDUSTRIAL TEMPERATURE RANGE

SEPTEMBER 2001

DSC-5742/4

PIN CONFIGURATION

$1\overline{OE}$	1	24	V_{CC}
$1B_1$	2	23	$2B_5$
$1A_1$	3	22	$2A_5$
$1A_2$	4	21	$2A_4$
$1B_2$	5	20	$2B_4$
$1B_3$	6	19	$2B_3$
$1A_3$	7	18	$2A_3$
$1A_4$	8	17	$2A_2$
$1B_4$	9	16	$2B_2$
$1B_5$	10	15	$2B_1$
$1A_5$	11	14	$2A_1$
GND	12	13	$2\overline{OE}$

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.

FUNCTION TABLE[1]

Input		Inputs/Outputs	
$1\overline{OE}$	$2\overline{OE}$	$1B_1 - 1B_5$	$2B_1 - 2B_5$
L	L	$1A_1 - 1A_5$	$2A_1 - 2A_5$
L	H	$1A_1 - 1A_5$	Z
H	L	Z	$2A_1 - 2A_5$
H	H	Z	Z

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   Z = High Impedance

OPERATING CHARACTERISTICS, $T_A = 25°C$[1]

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 Conditions: $T_A = -40°C$ 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 current 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

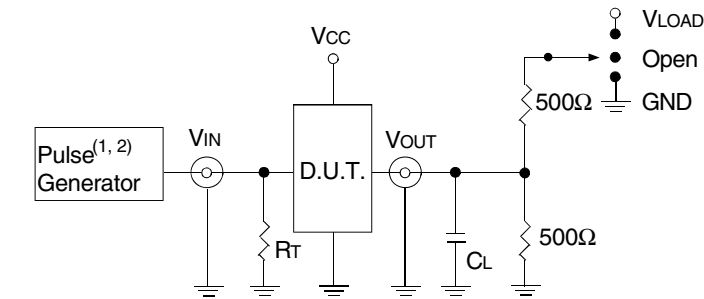| Symbol	Parameter	$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 3.3V \pm 0.3V$		Unit
		Min.	Max.	Min.	Max.	
t_{PD}[1]	Propagation Delay A to B or B to A	–	0.15	–	0.25	ns
t_{EN}	Output Enable Time $\overline{OE}$ to A or B	1	5	1	4.3	ns
t_{DIS}	Output Disable Time $\overline{OE}$ to A or B	1	5.5	1	5.5	ns

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 driven by an ideal voltage source (zero output impedance).

TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

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

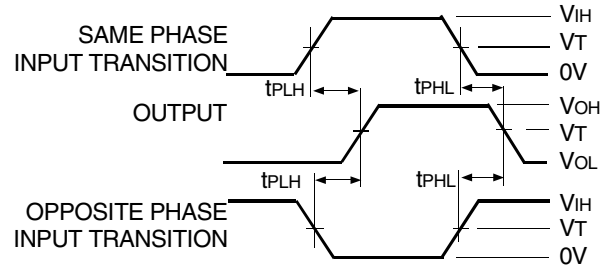*Test Circuits for All Outputs*

DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.
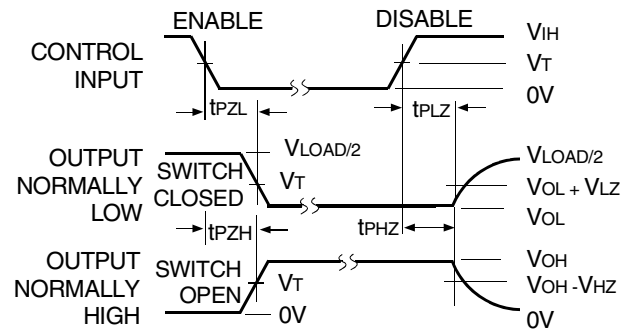
NOTES:

1. Pulse Generator for All Pulses: Rate $\leq$ 10MHz; $t_F \leq$ 2.5ns; $t_R \leq$ 2.5ns.
2. Pulse Generator for All Pulses: Rate $\leq$ 10MHz; $t_F \leq$ 2ns; $t_R \leq$ 2.5ns.

SWITCH POSITION

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

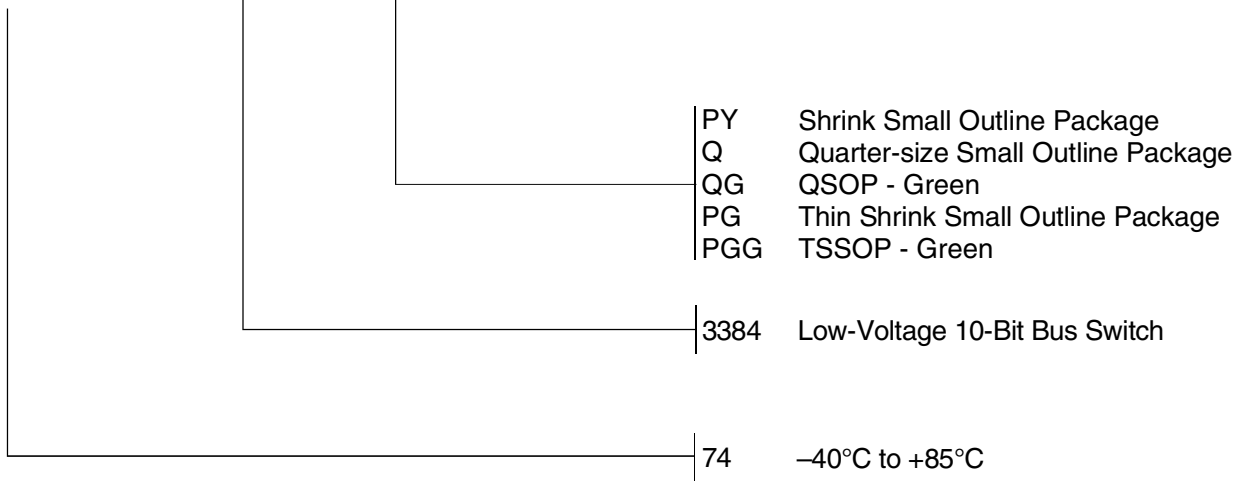*Propagation Delay*

Enable and Disable Times

ORDERING INFORMATION

IDT   <u>XX</u>   CBTLV   <u>XXX</u>   <u>XX</u>
     Temp. Range   Device Type   Package

PY	Shrink Small Outline Package
Q	Quarter-size Small Outline Package
QG	QSOP - Green
PG	Thin Shrink Small Outline Package
PGG	TSSOP - Green

3384	Low-Voltage 10-Bit Bus Switch

74	–40°C to +85°C