LOW-VOLTAGE 10-BIT BUS SWITCH

IDT74CBTLV3861

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 QSOP and TSSOP packages**

APPLICATIONS:

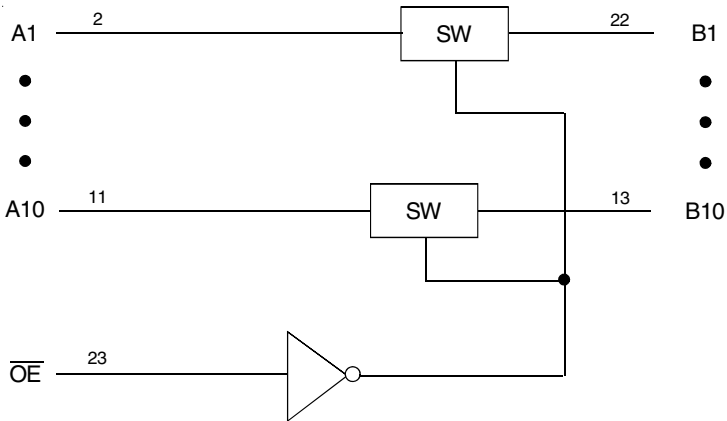- **3.3V High Speed Bus Switching and Bus Isolation**

DESCRIPTION:

The CBTLV3861 provides ten bits of high-speed bus switching with low on-state resistance of the switch allowing connections to be made with minimal propagation delay.
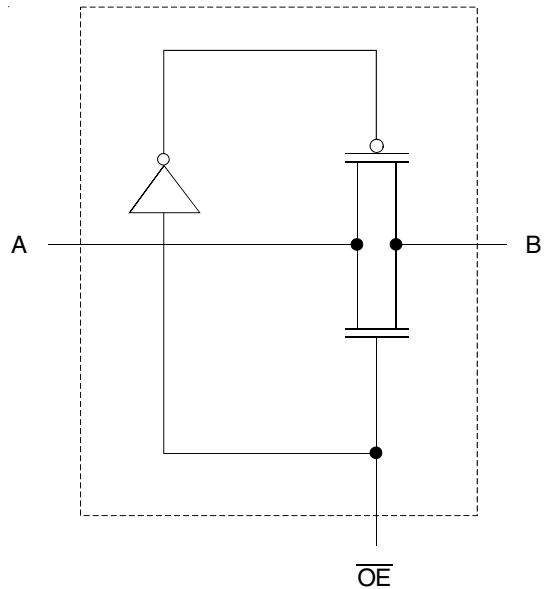
The device is organized as one 10-bit bus switch. When output enable ($\overline{OE}$) is low, the 10-bit bus switch is on and port A is connected to port B. When $\overline{OE}$ is high, the switch is open and a high-impedance state exists between the two ports.

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.
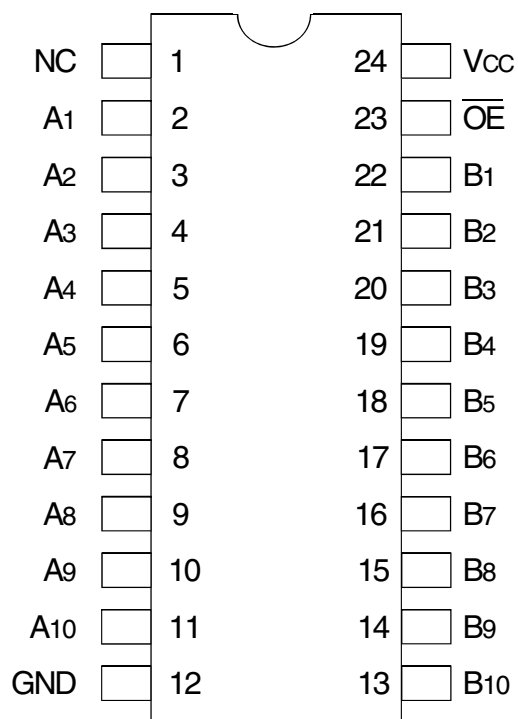
FUNCTIONAL BLOCK DIAGRAM

SIMPLIFIED SCHEMATIC, EACH SWITCH

INDUSTRIAL TEMPERATURE RANGE

JUNE 2006

DSC-5741/5

PIN CONFIGURATION

NC	1		24	V$_{CC}$
A$_1$	2		23	$\overline{OE}$
A$_2$	3		22	B$_1$
A$_3$	4		21	B$_2$
A$_4$	5		20	B$_3$
A$_5$	6		19	B$_4$
A$_6$	7		18	B$_5$
A$_7$	8		17	B$_6$
A$_8$	9		16	B$_7$
A$_9$	10		15	B$_8$
A$_{10}$	11		14	B$_9$
GND	12		13	B$_{10}$

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	Operation
$\overline{OE}$	
L	A Port = B Port
H	Disconnect

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level

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.[1]	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}[2]	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}		—	6	—	pF
R_{ON}[3]	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. Typical values are at V_{CC} = 3.3V, +25°C ambient.
2. The increase in supply current is attributable to each current that is at the specified voltage level rather than V_{CC} or GND.
3. This is measured by the voltage drop between the A and B terminals at the indicated current through the switch.

SWITCHING CHARACTERISTICS

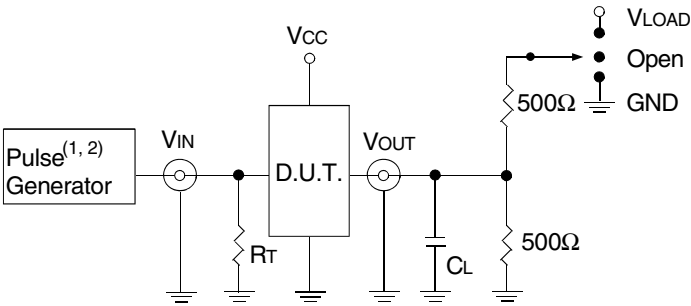| Symbol	Parameter	V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	
t_{PD}[1]	Propagation Delay A to B or B to A	–	0.15	–	0.25	ns
t_{EN}	Output Enable Time $\overline{OE}$ to A or B	1	4.5	1	4.2	ns
t_{DIS}	Output Disable Time $\overline{OE}$ to A or B	1	5	1	5	ns

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±0.3V	V_{CC}[2]= 2.5V±0.2V	Unit
V_{LOAD}	6	2 x 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

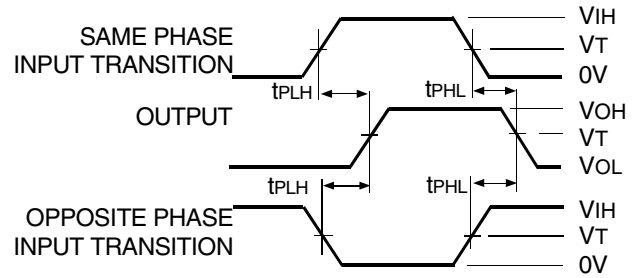*Test Circuits for All Outputs*

DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

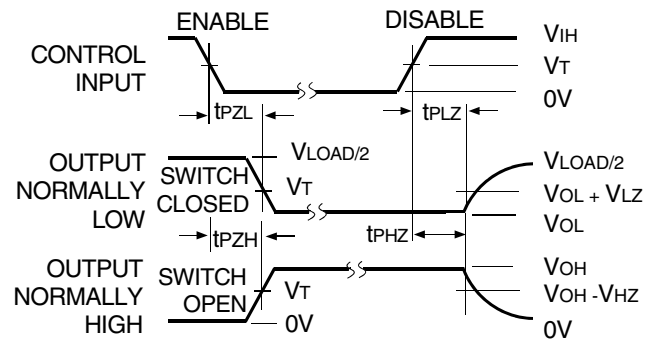R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

NOTES:

1. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; t_F ≤ 2ns; t_R ≤ 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 _____ XX _____ CBTLV _____ XXX _____ _____ XX _____
　　　　Temp. Range　　　　　　Device Type　　Package

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

3861	Low-Voltage 10-Bit Bus Switch

74	–40°C to +85°C