



# LOW-VOLTAGE QUADRUPLE BUS SWITCH

**IDT74CBTLV3126**

## FEATURES

- Pin-Out Compatible with Standard '126 Logic Products
- 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)
- Output Enable, Active High
- Available in TSSOP and QSOP packages

## APPLICATIONS:

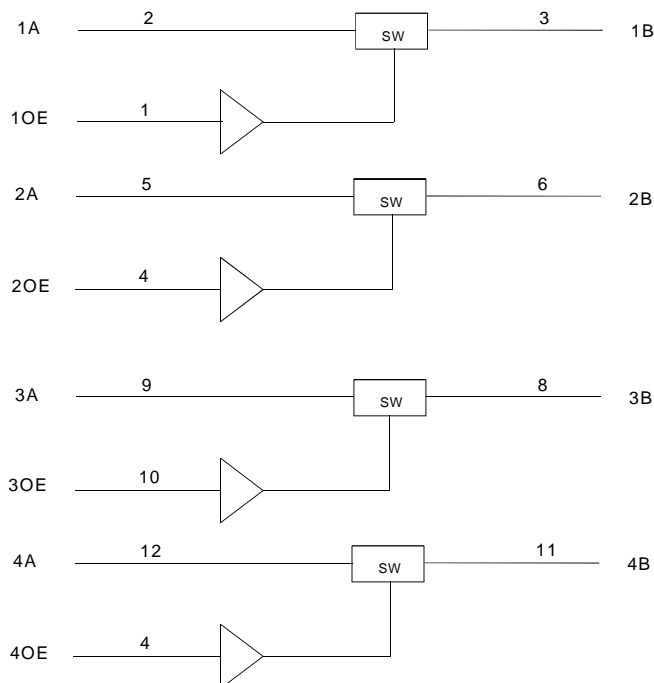
- 3.3V High Speed Bus Switching and Bus Isolation

## DESCRIPTION:

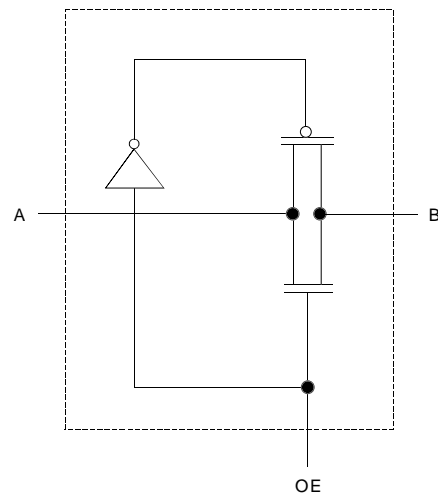
The CBTLV3126 features four independent switches. Each switch is enabled when the associated output-enable (OE) input is high.

To ensure the high-impedance state during power up or power down, OE should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

## FUNCTIONAL BLOCK DIAGRAM



## SIMPLIFIED SCHEMATIC, EACH SWITCH



## NOTE:

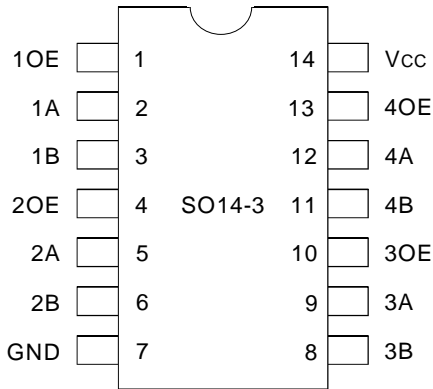
1. Pin numbers shown apply to the 14-pin TSSOP package.

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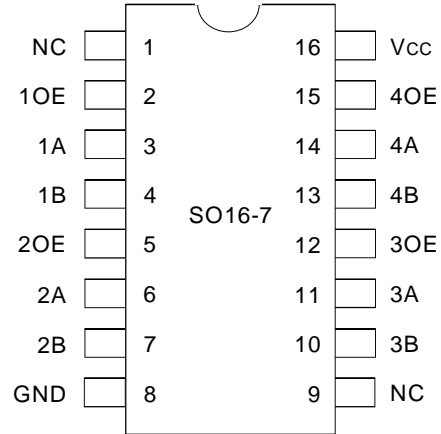
**INDUSTRIAL TEMPERATURE RANGE**

**MARCH 2001**

## PIN CONFIGURATION



TSSOP  
TOP VIEW



QSOP  
TOP VIEW

## ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Description	Max.	Unit
V <sub>CC</sub>	Supply Voltage Range	-0.5 to 4.6	V
V <sub>I</sub>	Input Voltage Range	-0.5 to 4.6	V
	Continuous Channel Current	128	mA
I <sub>IK</sub>	Input Clamp Current, V <sub>I/O</sub> < 0	-50	mA
T <sub>STG</sub>	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 OE	Inputs/Outputs
H	A Port = B Port
L	Disconnect

**NOTE:**

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

## OPERATING CHARACTERISTICS, T<sub>A</sub> = 25°C

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage		2.3	3.6	V
V <sub>IH</sub>	High-Level Control Input Voltage	V <sub>CC</sub> = 2.3V to 2.7V	1.7	—	V
		V <sub>CC</sub> = 2.7V to 3.6V	2	—	
V <sub>IL</sub>	Low-Level Control Input Voltage	V <sub>CC</sub> = 2.3V to 2.7V	—	0.7	V
		V <sub>CC</sub> = 2.7V to 3.6V	—	0.8	
T <sub>A</sub>	Operating Free-Air Temperature		-40	85	°C

**NOTE:**

1. All unused control inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper operation of the device.

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition:  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

Symbol	Parameter	Test Conditions	Min.	Typ. <sup>(1)</sup>	Max.	Unit	
$V_{IK}$	Control Inputs, Data I/O	$V_{CC} = 3V, I_i = -18\text{mA}$	—	—	-1.2	V	
$I_i$	Control Inputs, Data I/O	$V_{CC} = 3.6V, V_i = V_{CC}$ or GND	—	—	$\pm 1$	$\mu\text{A}$	
$I_{OZ}$	Data I/O	$V_{CC} = 3.6V, V_o = 0$ or $3.6V$ , switch disabled	—	—	5	$\mu\text{A}$	
$I_{OFF}$		$V_{CC} = 0, V_i$ or $V_o = 0$ to $3.6V$	—	—	50	$\mu\text{A}$	
$I_{CC}$		$V_{CC} = 3.6V, I_o = 0, V_i = V_{CC}$ or GND	—	—	10	$\mu\text{A}$	
$\Delta I_{CC}^{(2)}$	Control Inputs	$V_{CC} = 3.6V$ , One input at $3V$ , Other inputs at $V_{CC}$ or GND	—	—	300	$\mu\text{A}$	
$C_i$	Control Inputs	$V_i = 3V$ or $0$	—	4	—	pF	
$C_{iO(OFF)}$		$V_o = 3V$ or $0, OE = \text{GND}$	—	6	—	pF	
$R_{ON}^{(3)}$	Max at $V_{CC} = 2.3V$ Typ at $V_{CC} = 2.5V$	$V_i = 0$	$I_o = 64\text{mA}$	—	5	8	$\Omega$
			$I_o = 24\text{mA}$	—	5	8	
	$V_i = 1.7V$	$I_o = 15\text{mA}$	—	27	40		
	$V_{CC} = 3V$	$V_i = 0$	$I_o = 64\text{mA}$	—	5	7	
			$I_o = 24\text{mA}$	—	5	7	
		$V_i = 2.4V$	$I_o = 15\text{mA}$	—	10	15	

### NOTES:

1. Typical values are at  $3.3V, +25^{\circ}\text{C}$  ambient.
2. The increase in supply current is attributable to each input 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. 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 OE to A or B	1	4.5	1	4.2	ns
$t_{DIS}$	Output Disable Time OE to A or B	1	4.7	1	4.8	ns

### NOTE:

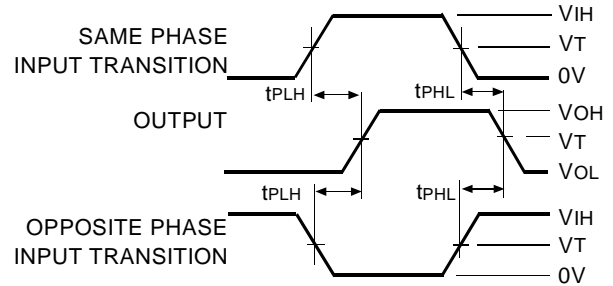
1. The propagation time is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance when driven by an ideal voltage source (zero output impedance).

## TEST CIRCUITS AND WAVEFORMS

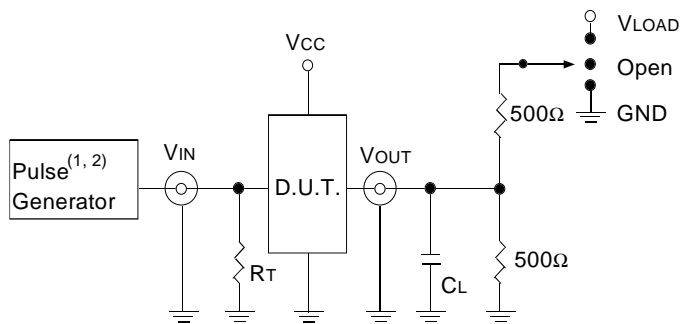
### TEST CONDITIONS

Symbol	Vcc(1)= 3.3V ± 0.3V	Vcc(2)= 2.5V ± 0.2V	Unit
V <sub>LOAD</sub>	6	2 x V <sub>cc</sub>	V
V <sub>IH</sub>	3	V <sub>cc</sub>	V
V <sub>T</sub>	1.5	V <sub>cc</sub> /2	V
V <sub>LZ</sub>	300	150	mV
V <sub>HZ</sub>	300	150	mV
C <sub>L</sub>	50	30	pF

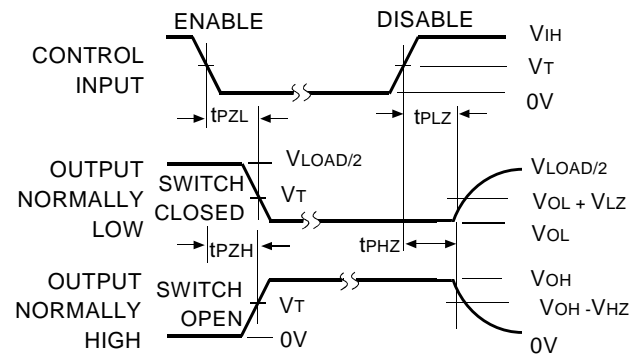
### PROPAGATION DELAY



### TEST CIRCUITS FOR ALL OUTPUTS



### ENABLE AND DISABLE TIMES



#### DEFINITIONS:

1. C<sub>L</sub> = Load capacitance: includes jig and probe capacitance.
2. R<sub>T</sub> = Termination resistance: should be equal to Z<sub>OUT</sub> of the Pulse Generator.

#### NOTES:

1. Pulse Generator for all pulses: Rate ≤ 10MHz; t<sub>F</sub> ≤ 2.5ns; t<sub>R</sub> ≤ 2.5ns.
2. Pulse Generator for all pulses: Rate ≤ 10MHz; t<sub>F</sub> ≤ 2ns; t<sub>R</sub> ≤ 2ns.

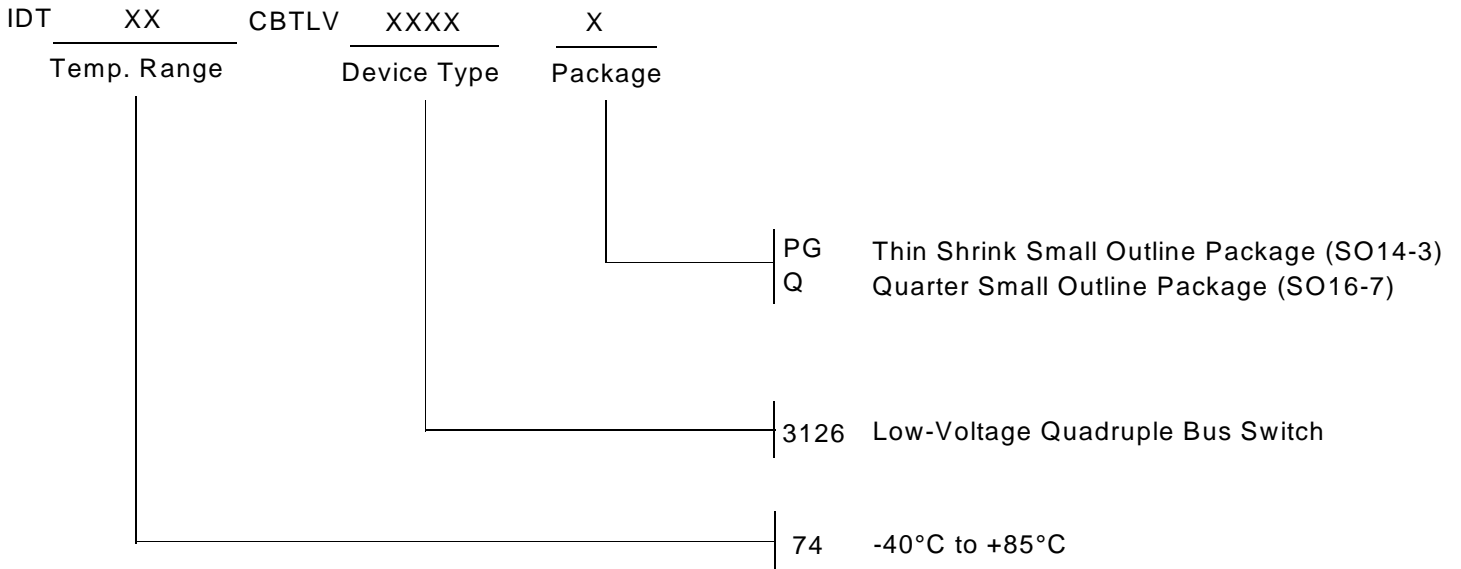
#### NOTE:

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

### SWITCH POSITION

Test	Switch
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>LOAD</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND
t <sub>PD</sub>	Open

## ORDERING INFORMATION



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