

# 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
- 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:**

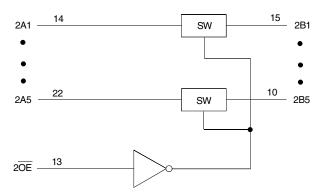
The CBTLV3384 is a ten bit high-speed bus switch with low on-state resistance of the switch allowing connections to be made with minimal propagation delay.

The device is organized as dual 5-bit bus switches with separate outputenable ( $\overline{OE}$ ) 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 highimpedance state exists between the two ports.

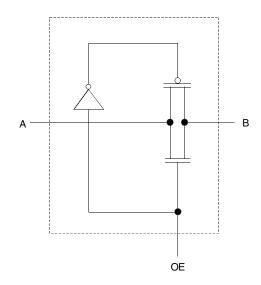
To ensure the high-impedance state during power up or power down,  $\overline{\text{OE}}$  should be tied to Vcc through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### FUNCTIONAL BLOCK DIAGRAM

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# SIMPLIFIED SCHEMATIC, EACH SWITCH

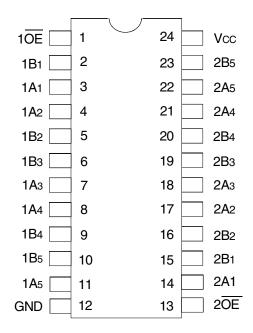


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INDUSTRIAL TEMPERATURE RANGE

SEPTEMBER 2001

# **PIN CONFIGURATION**



SSOP/ QSOP/ TSSOP TOP VIEW

# ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description	Max	Unit
Vcc	SupplyVoltage Range	-0.5 to +4.6	V
Vı	Input Voltage Range	-0.5 to +4.6	V
	Continuous Channel Current	128	mA
lik	Input Clamp Current, VI/O < 0	-50	mA
Tstg	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)

Inp	out	Inputs/Outputs		
10E	20E	1 <b>B</b> 1 - 1 <b>B</b> 5	2 <b>B</b> 1 - 2 <b>B</b> 5	
L	L	1 <b>A</b> 1 - 1 <b>A</b> 5	2 <b>A</b> 1 - 2 <b>A</b> 5	
L	Н	1 <b>A</b> 1 - 1 <b>A</b> 5	Z	
Н	L	Z	2 <b>A</b> 1 - 2 <b>A</b> 5	
Н	Н	Z	Z	

#### NOTE:

1. H = HIGH Voltage Level

L = LOW Voltage Level

Z = High Impedance

# OPERATING CHARACTERISTICS, TA = 25°C(1)

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
Vcc	Supply Voltage		2.3	3.6	V
VIH	High-Level Control Input Voltage	Vcc = 2.3V to 2.7V	1.7	_	V
		Vcc = 2.7V to 3.6V	2	_	
VIL	Low-Level Control Input Voltage	Vcc = 2.3V to 2.7V	_	0.7	V
		Vcc = 2.7V to 3.6V		0.8	
TA	Operating Free-Air Temperature		-40	85	°C

#### NOTE:

1. All unused control inputs of the device must be held at Vcc or GND to ensure proper device operation.

# DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Conditions:  $TA = -40^{\circ}C$  to  $+85^{\circ}C$ 

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
Vik	Control Inputs, Data I/O	Vcc = 3V, II = -18mA		_	_	-1.2	V
lı	Control Inputs, Data I/O	Vcc = 3.6V, VI = Vcc or GN	D	_	_	±1	μA
loz	Data I/O	Vcc = 3.6V, Vo = 0 or 3.6V,	switch disabled	T -	_	5	μA
loff		Vcc = 0, Vi or Vo = 0 to 3.6\	I	_	_	50	μA
Icc		Vcc = 3.6V, lo = 0, VI = Vc	Vcc = 3.6V, Io = 0, VI = Vcc or GND		_	10	μA
$\Delta I$ cc <sup>(1)</sup>	Control Inputs	Vcc = 3.6V, one input at 3V,	Vcc = 3.6V, one input at 3V, other inputs at Vcc or GND		_	300	μA
Сі	Control Inputs	VI = 3V or 0		_	4	_	pF
CIO(OFF)		$Vo = 3V \text{ or } 0, \overline{OE} = Vcc$		T -	7	_	pF
	Max. at Vcc = 2.3V	VI = 0	Io = 64mA	_	5	8	
	Typ. at Vcc = 2.5V		Io = 24mA	_	5	8	
Ron <sup>(2)</sup>		VI = 1.7V	Io = 15mA	_	27	40	Ω
		VI = 0	Io = 64mA	_	5	7	
	Vcc = 3V		Io = 24mA	_	5	7	
		VI = 2.4V	Io = 15mA	_	10	15	

#### NOTES:

- 1. The increase in supply current is attributable to each current that is at the specified voltage level rather than Vcc 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**

		Vcc = 2.5V ± 0.2V		Vcc = 3.3V ± 0.3V		
Symbol	Parameter	Min.	Max.	Min.	Max.	Unit
tPD <sup>(1)</sup>	Propagation Delay	-	0.15	-	0.25	ns
	A to B or B to A					
ten	Output Enable Time	1	5	1	4.3	ns
	OE to A or B					
tois	Output Disable Time	1	5.5	1	5.5	ns
	OE to A or B					

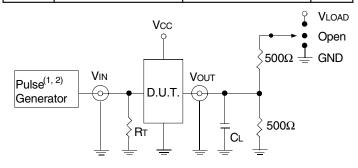
#### NOTE:

<sup>1.</sup> 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	Vcc <sup>(1)</sup> = 3.3V±0.3V	Vcc <sup>(2)</sup> = 2.5V±0.2V	Unit
VLOAD	6	2 x Vcc	V
ViH	3	Vcc	V
VT	1.5	Vcc / 2	٧
VLZ	300	150	mV
VHZ	300	150	mV
CL	50	30	pF



Test Circuits for All Outputs

#### **DEFINITIONS:**

CL = Load capacitance: includes jig and probe capacitance.

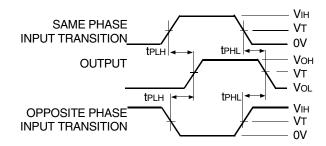
RT = Termination resistance: should be equal to ZouT of the Pulse Generator.

### NOTES:

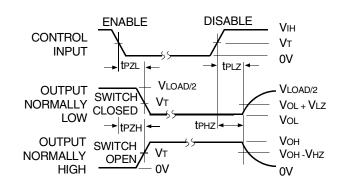
- 1. Pulse Generator for All Pulses: Rate  $\leq$  10MHz; tr  $\leq$  2.5ns; tr  $\leq$  2.5ns.
- 2. Pulse Generator for All Pulses: Rate  $\leq$  10MHz; tF  $\leq$  2ns; tR  $\leq$  2.5ns.

# **SWITCH POSITION**

Test	Switch
tplz/tpzl	Vload
tphz/tpzh	GND
teo	Open

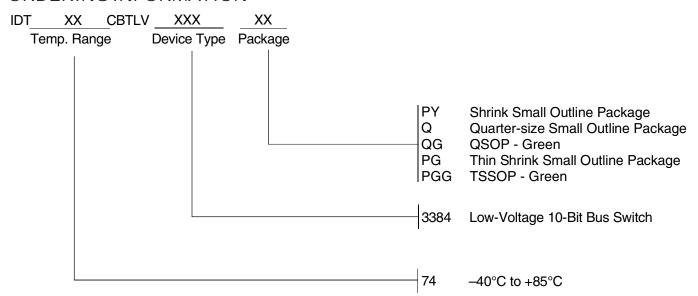


#### Propagation Delay



**Enable and Disable Times** 

# ORDERING INFORMATION





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