LOW-VOLTAGE 8:1 MULTIPLEXER/ DEMULTIPLEXER

IDT74CBTLV3251

FEATURES:

- **Functionally equivalent to QS3251**
- **5Ω switch connection between two ports**
- **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**

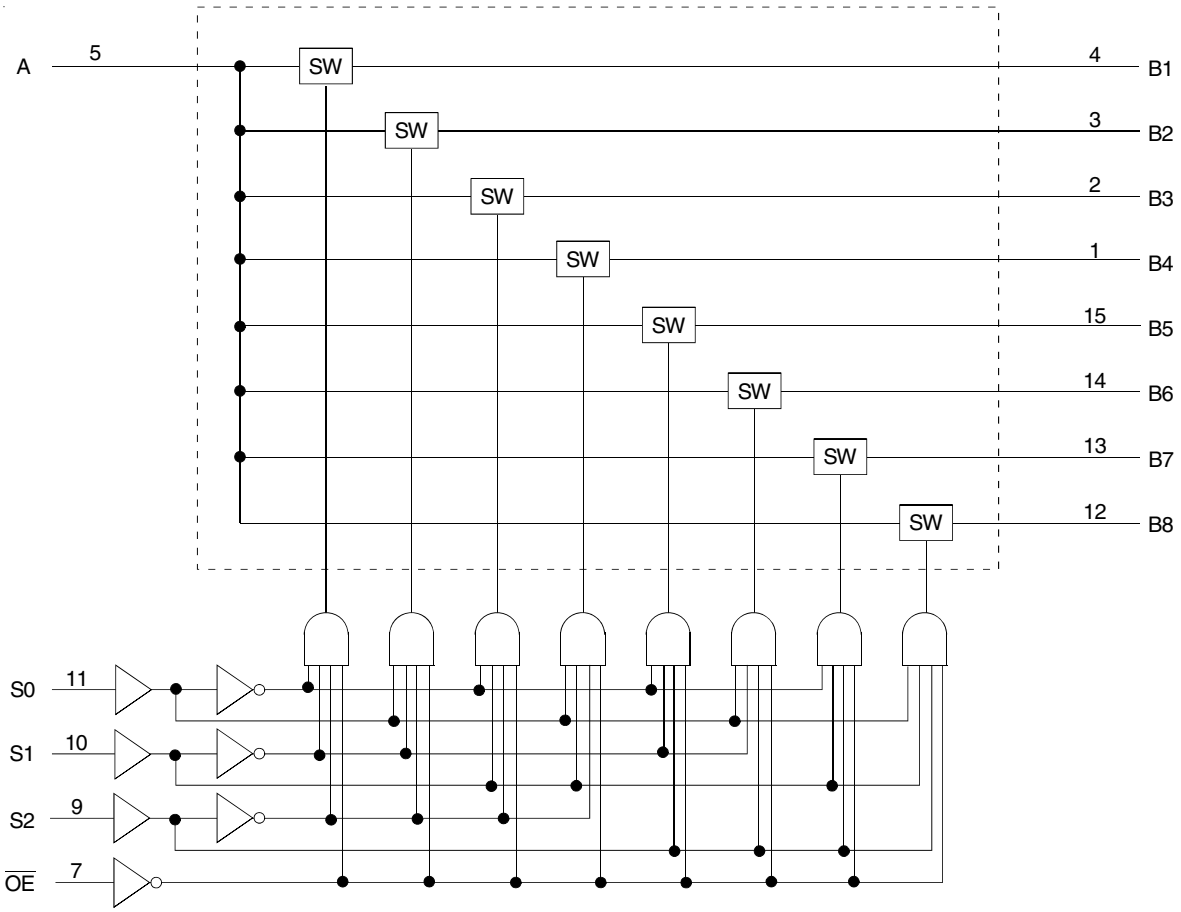
DESCRIPTION:

The CBTLV3251 is a 1-of-8 high-speed multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

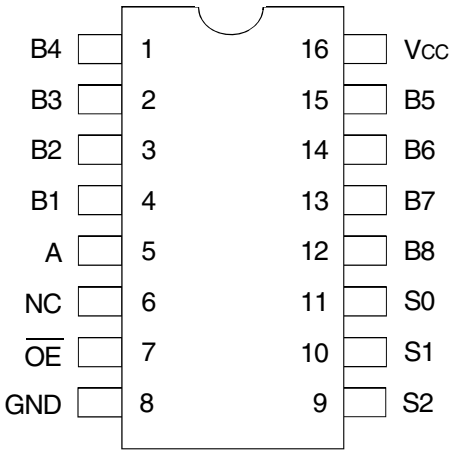
The select input (S0, S1, S2) controls the data flow. The multiplexer/ demultiplexer switches are disabled when the output-enable ($\overline{OE}$) input is high.

To ensure that the device is in 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



PIN CONFIGURATION



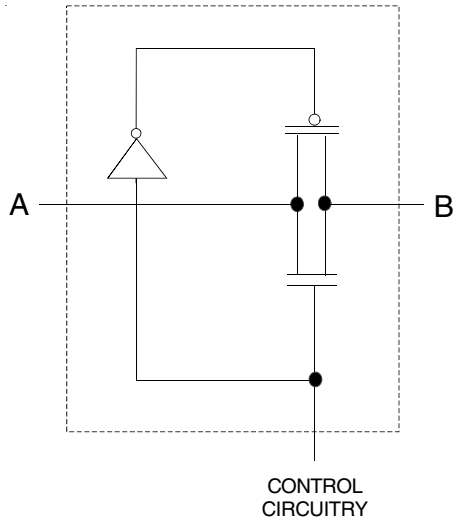
QSOP / TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description	Max	Unit
V_{CC}	SupplyVoltage 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.

SIMPLIFIED SCHEMATIC, EACH SWITCH



FUNCTION TABLE(1)

Inputs				
$\overline{OE}$	S2	S1	S0	Function
L	L	L	L	A Port = B1 Port
L	L	L	H	A Port = B2 Port
L	L	H	L	A Port = B3 Port
L	L	H	H	A Port = B4 Port
L	H	L	L	A Port = B5 Port
L	H	L	H	A Port = B6 Port
L	H	H	L	A Port = B7 Port
L	H	H	H	A Port = B8 Port
H	X	X	X	Disconnect

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

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 Inputs	V_{CC} = 3V, I_I = –18mA		—	—	–1.2	V
I_I	Control Inputs	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
$C_{IO(OFF)}$	A Port	V_O = 3V or 0, $\overline{OE}$ = V_{CC} = 3.3V		—	40.5	—	pF
	B Port			—	6	—	
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. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

SWITCHING CHARACTERISTICS

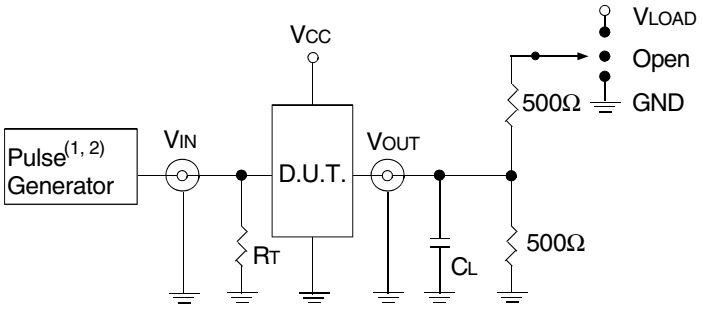
Symbol	Parameter	V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	
t_{PD}(1)	Propagation Delay A to B or B to A	–	0.15	–	0.25	ns
t_{SEL}	Select Time S to A or B	1	4.8	1	4.5	ns
t_{EN}	Enable Time S to B	1	4.8	1	4.5	ns
t_{DIS}	Disable Time S to B	1	5.1	1	5.3	ns
t_{EN}	Output Enable Time $\overline{OE}$ to A or B	1	5	1	4.8	ns
t_{DIS}	Output Disable Time $\overline{OE}$ to A or B	1	5.5	1	6	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 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



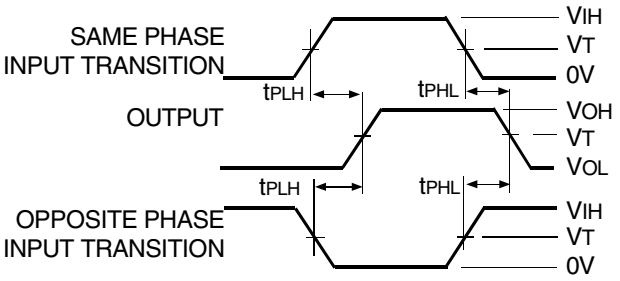
Test Circuits for All Outputs

DEFINITIONS:
C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

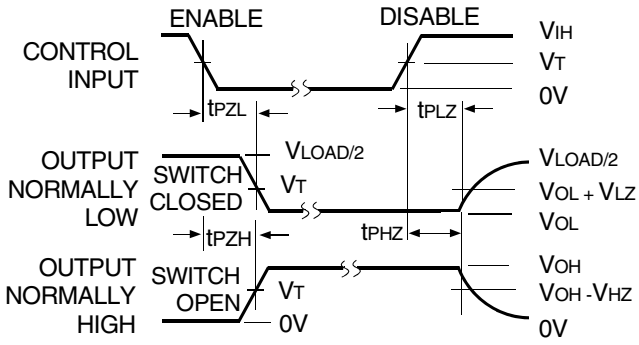
NOTES:
1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2ns; t_R ≤ 2.5ns.

SWITCH POSITION

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

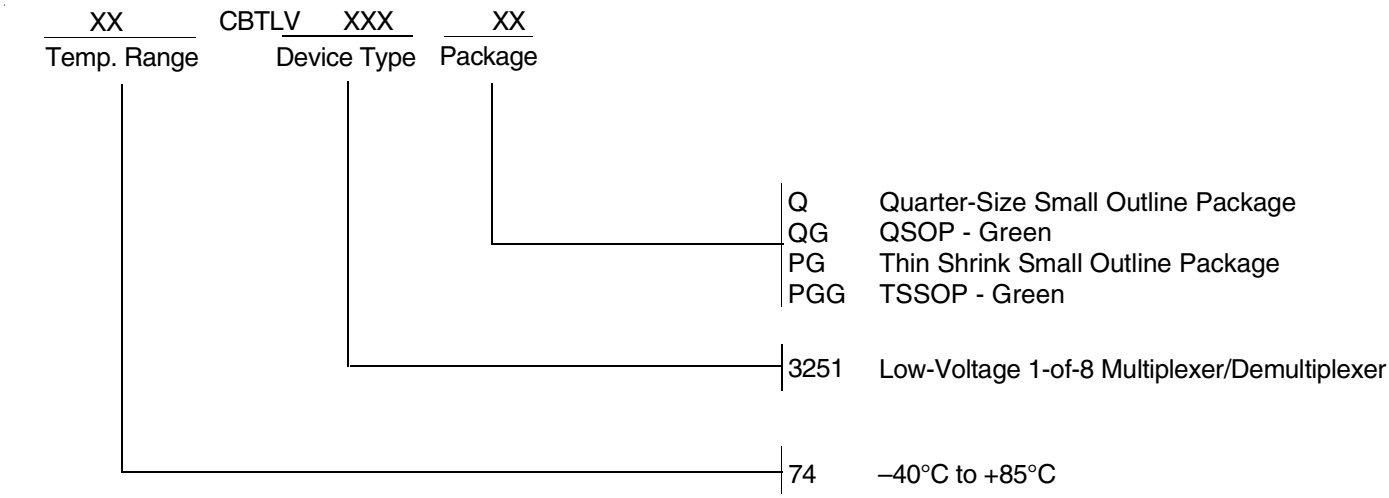


Propagation Delay



Enable and Disable Times

ORDERING INFORMATION



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