IDT74CBTLV3257

LOW-VOLTAGE QUAD 2:1MUX/DEMUX BUS SWITCH

FEATURES:

– Functionally equivalent to QS3257
– 5Ω Switch Connection between Two Ports
– 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:

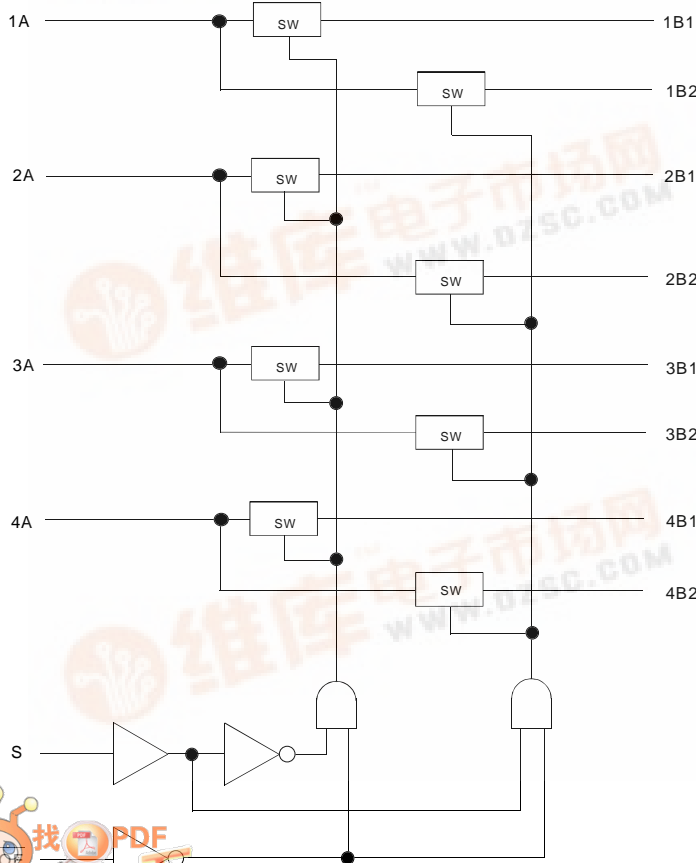– 3.3V High Speed Bus Switching, Multiplexing, and Bus Isolation

DESCRIPTION:

The CBTLV3257 is a quad 2:1 multiplexer/demultiplexer. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.
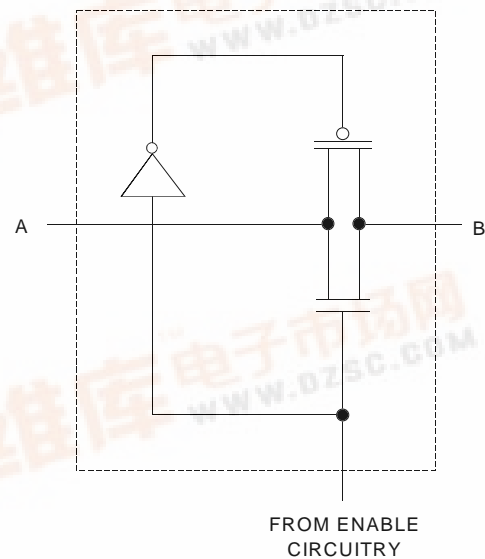
The select (S) input controls the data flow. The multiplexers/demultiplexers are enabled when the output-enable ($\overline{OE}$) input is low.

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.
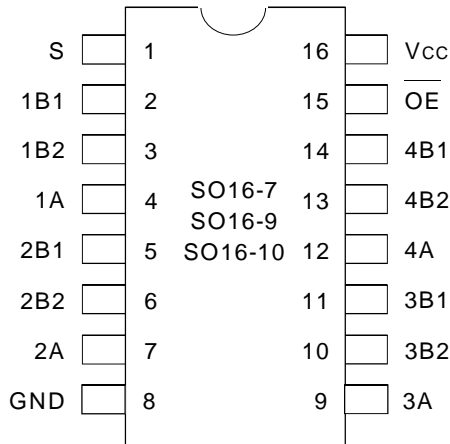
FUNCTIONAL BLOCK DIAGRAM

SIMPLIFIED SCHEMATIC, EACH SWITCH

FROM ENABLE CIRCUITRY

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INDUSTRIAL TEMPERATURE RANGE   **SEPTEMBER 2001**

PIN CONFIGURATION

S	1		16	V_{CC}
1B1	2		15	$\overline{OE}$
1B2	3		14	4B1
1A	4	SO16-7	13	4B2
2B1	5	SO16-9 SO16-10	12	4A
2B2	6		11	3B1
2A	7		10	3B2
GND	8		9	3A

QSOP/ SSOP/ 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

NOTES:
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]

Inputs		
$\overline{OE}$	S	Function
L	L	A Port = B1 Port
L	H	A Port = B2 Port
H	X	Disconnect

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

OPERATING CHARACTERISTICS, T_A = 25°C

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 operation.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Operating Condition: 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		—	—	20	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		—	13	—	pF
	B port			—	6	—	
R_{ON} [3]	Max at V_{CC} = 2.3V	V_I = 0	I_O = 64mA	—	5	8	Ω
	Typ at V_{CC} = 2.5V		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 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

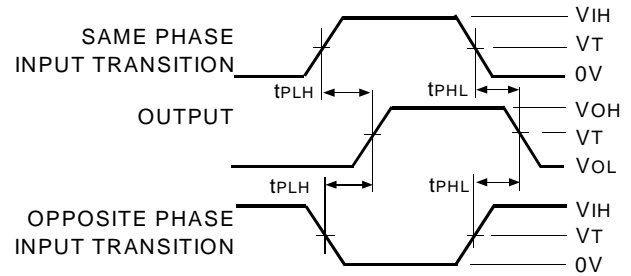| Symbol	Parameter	V_{CC} = 2.5V ± 0.2V		V_{CC} = 3.3V ± 0.3V		Unit
		Min.	Max.	Min.	Max.	
t_{PD} [1]	Propagation Delay A to B or B to A	–	0.15	–	0.25	ns
t_{SEL}	Select Time S to A or B	1	6.1	1	5.3	ns
t_{EN}	Enable Time S to B	1	6.1	1	5.3	ns
t_{DIS}	Disable Time S to B	1	4.8	1	4.5	ns
t_{EN}	Enable Time $\overline{OE}$ to A or B	1	5.6	1	5	ns
t_{DIS}	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 when driven by an ideal voltage source (zero output impedance).
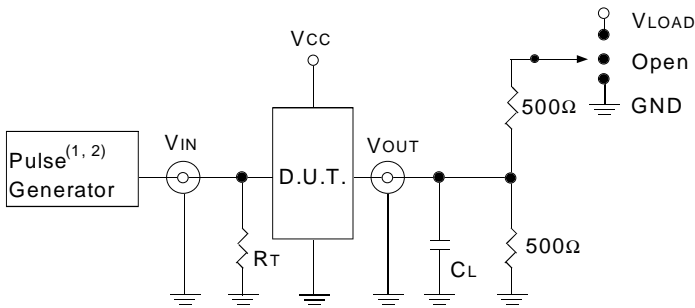
TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

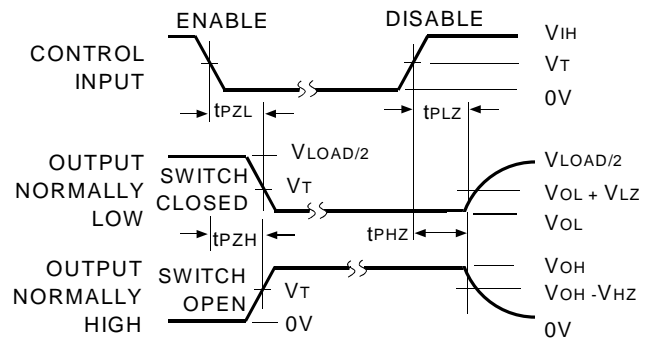| Symbol	V_{CC}[(1)]= 3.3V ± 0.3V	V_{CC}[(2)]= 2.5V ± 0.2V	Unit
V_{LOAD}	6	2 x V_{CC}	V
V_{IH}	3	V_{CC}	V
V_T	1.5	V_{CC}/2	V
V_{LZ}	300	150	mV
V_{HZ}	300	150	mV
C_L	50	30	pF

PROPAGATION DELAY/ SELECT TIME

TEST CIRCUITS FOR ALL OUTPUTS

ENABLE AND DISABLE TIMES

DEFINITIONS:

C_L = Load capacitance: includes jig and load 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
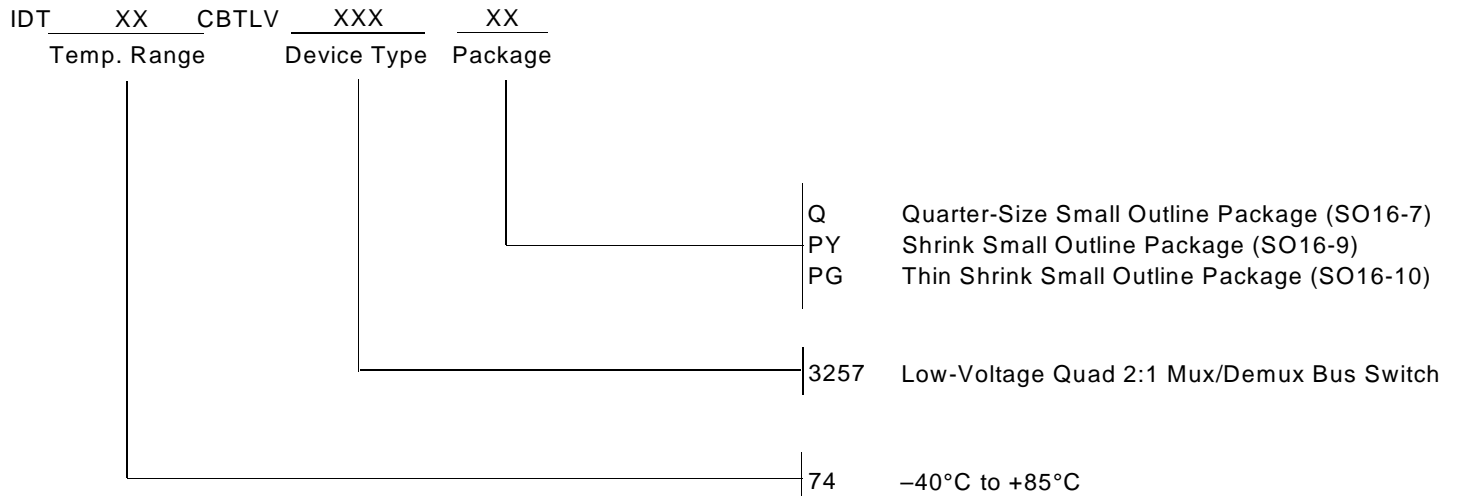2. Pulse Generator for all pulses: Rate ≤ 10MHz; t_F ≤ 2ns, t_R ≤ 2ns

NOTE:

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

SWITCH POSITION

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

ORDERING INFORMATION

IDT   XX   CBTLV   XXX   XX

Temp. Range   Device Type Package

Q	Quarter-Size Small Outline Package (SO16-7)
PY	Shrink Small Outline Package (SO16-9)
PG	Thin Shrink Small Outline Package (SO16-10)

3257	Low-Voltage Quad 2:1 Mux/Demux Bus Switch

74	−40°C to +85°C