LOW-VOLTAGE 10-BIT BUS SWITCH WITH PRECHARGED OUTPUTS

IDT74CBTLV6800

FEATURES:

- Functionally equivalent to QS3800
- 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 SSOP, QSOP, and TSSOP packages

APPLICATIONS:

- 3.3V High Speed Bus Switching and Bus Isolation

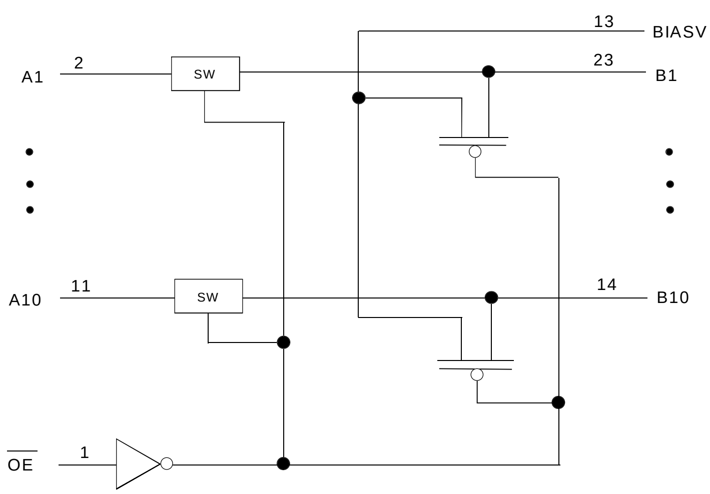
DESCRIPTION:

The CBTLV6800 provides 10-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 also precharges the B port to a user-selectable bias voltage (BIASV) to minimize live-insertion noise.

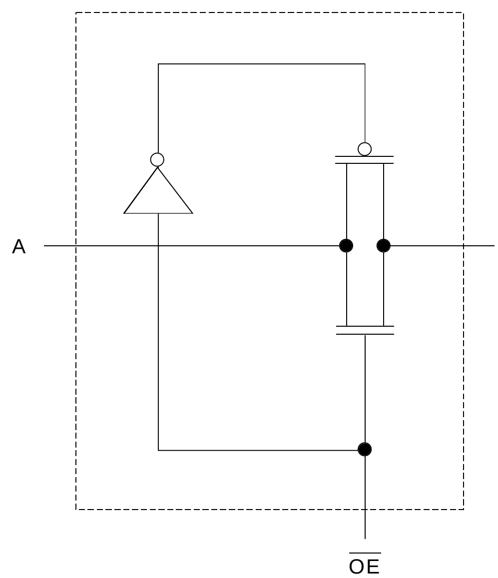
The CBTLV6800 is organized as a single 10-bit bus switch with a single output-enable ($\overline{OE}$) input. When $\overline{OE}$ is low, the 10-bit bus switch is on and port A is connected to port B. When $\overline{OE}$ is high, the switch is open, and a high impedance state exists between the two ports, and port B is precharged to BIASV through the equivalent of a 10-kΩ resistor.

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

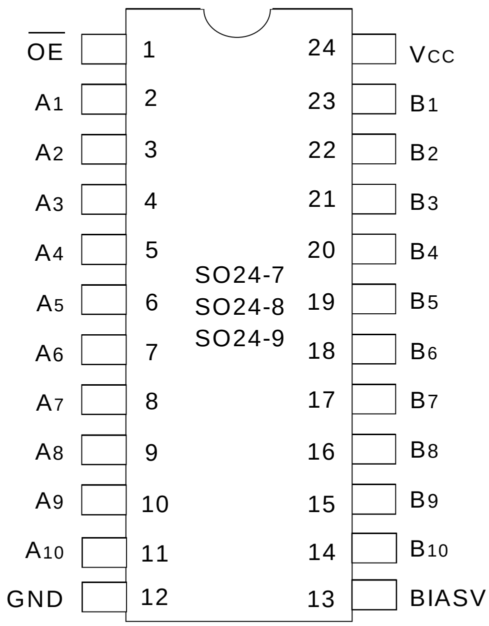


SIMPLIFIED SCHEMATIC, EACH SWITCH



INDUSTRIAL TEMPERATURE RANGE **APRIL 2001**

PIN CONFIGURATION



SSOP/ QSOP/ TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Description	Max.	Unit
V_{CC}	Supply Voltage Range	–0.5 to 4.6	V
BIASV	Bias Voltage Range, V_I	–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 $\overline{OE}$	Inputs/Outputs
L	A Port = B Port
H	A Port = Z B Port = BIASV

OPERATING CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{CC}	Supply Voltage		2.3	3.6	V
BIASV	Bias Voltage		1.3	V_{CC}	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 Condition: T_A = – 40°C to +85°C

Symbol	Parameter	Test Conditions		Min.	Typ.	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 = 0V or 3.6V switch disabled		—	—	±20	µA
I_{OFF}		V_{CC} = 0, V_I or V_O = 0 to 3.6V		—	—	50	µA
$\lvert I_O \rvert$		V_{CC} = 3V, BIASV = 2.4V, V_O = 0, $\overline{OE}$ = V_{CC}		0.25	—	—	mA
I_{CC}		V_{CC} = 3.6V, I_O = 0, V_I = V_{CC} or GND		—	—	10	µA
ΔI_{CC} (1)	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, Switch Off, BIASV = Open, $\overline{OE}$ = V_{CC}		—	7	—	pF
R_{ON} (2)	V_{CC} = 2.3V Typ at V_{CC} = 2.5V	V_I = 0	I_I = 64mA	—	5	8	Ω
			I_I = 24mA	—	5	8	
		V_I = 1.7V	I_I = 15mA	—	27	40	
	V_{CC} = 3V	V_I = 0	I_I = 64mA	—	5	7	
			I_I = 24mA	—	5	7	
		V_I = 2.4V	I_I = 15mA	—	10	15	

NOTES:
1. The increase in supply current is attributable to each input that is at the specified voltage level rather than V_{CC} 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

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_{PZH}	BIASV = GND $\overline{OE}$ to A or B	1	4.8	1	4.5	ns
t_{PZL}	BIASV = 3V $\overline{OE}$ to A or B	1	4.8	1	4.5	ns
t_{PHZ}	BIASV = GND $\overline{OE}$ to A or B	1	5.6	1	5.5	ns
t_{PLZ}	BIASV = 3V $\overline{OE}$ to A or B	1	5.6	1	5.5	ns

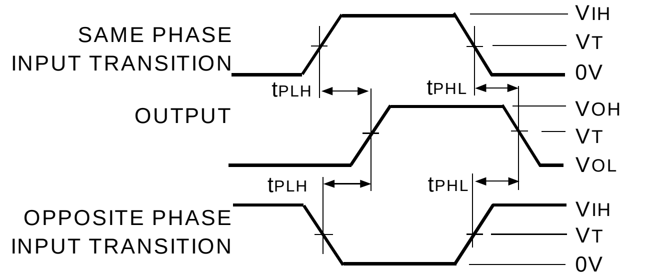
NOTE:
1. The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance when driven by an ideal voltage source (zero output impededance).

TEST CIRCUITS AND WAVEFORMS

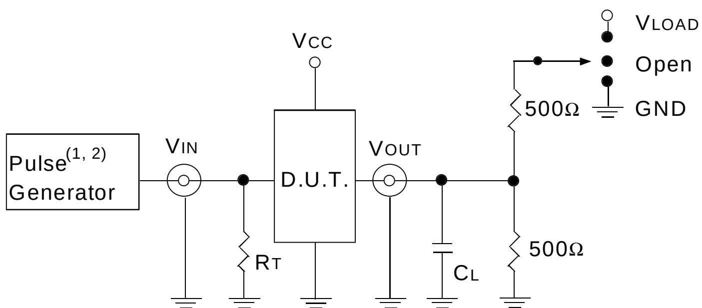
TEST CONDITIONS

Symbol	Vcc[1]= 3.3V ± 0.3V	Vcc[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

PROPAGATION DELAY



TEST CIRCUITS FOR ALL OUTPUTS



DEFINITIONS:

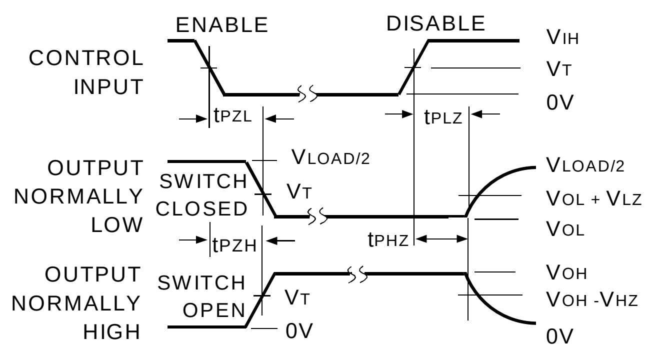
C_L = Load capacitance: includes jig and probe capacitance.

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 ≤ 2ns.

ENABLE AND DISABLE TIMES



NOTE:

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

SWITCH POSITION

Test	Switch
t_{PLZ}/t_{PZL}	VLOAD
t_{PHZ}/t_{PZH}	GND
t_{PD}	Open

ORDERING INFORMATION

IDT XX CBTLV XXX XX

Temp. Range — Device Type — Package

PY	Shrink Small Outline Package (SO20-7)
Q	Quarter-size Small Outline Package (SO20-8)
PG	Thin Shrink Small Outline Package (SO20-9)
6800	Low-Voltage 10-Bit Bus Switch with Precharged Outputs
74	–40°C to +85°C

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