

TC7WBL125AFK

Low-Voltage Dual Bus Switch

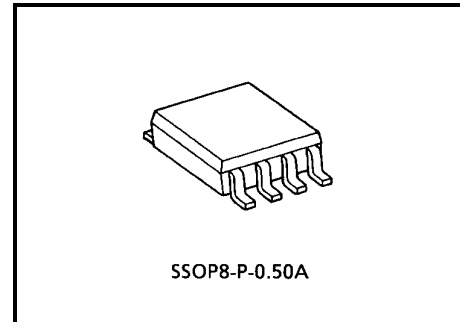
The TC7WBL125AFK provides two bits of low-voltage, high-speed bus switching. The low ON-resistance of the switch allows connections to be made with minimal propagation delay and while maintaining CMOS low power dissipation.

The device comprises dual 2-bit switches with separate bus enable ($\overline{OE}$) signals. When $\overline{OE}$ is low, the switch is on and port A is connected to port B. When $\overline{OE}$ is high, the switch is off and a high-impedance state exists between the two ports.

All inputs are equipped with protection circuits to guard against static discharge.

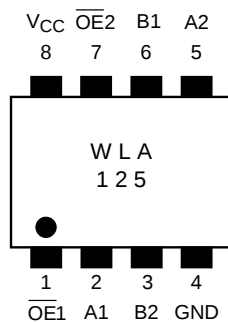
Features

- Operating voltage range: $V_{CC} = 2$ to 3.6 V
- High speed: $t_{pd} = 0.31$ ns (max) @ 3 V
- Ultra-low ON-resistance: $R_{ON} = 5\ \Omega$ (typ.) @ 3 V
- ESD performance: human-body model > 2000 V; machine model > 200 V
- Power-down protection provided on inputs ($\overline{OE}$ input only)
- Package: US8



Weight: 0.01 g (typ.)

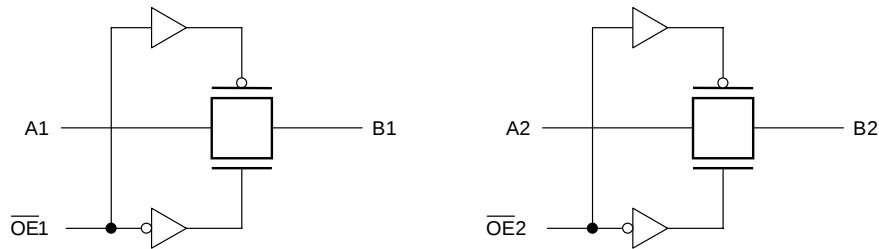
Pin Assignment (top view)



Truth Table

Inputs	Function
$\overline{OE}$	
L	A port = B port
H	Disconnect

Logic Diagram



Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Power supply range		V_{CC}	-0.5~4.6	V
Control pin input voltage		V_{IN}	-0.5~4.6	V
Switch terminal I/O voltage		V_S	-0.5~ $V_{CC}+0.5$	V
Clump diode current	Control input pin	I_{IK}	-50	mA
	Switch terminal		± 50	
Switch I/O current		I_S	128	mA
Power dissipation		P_D	200	mW
DC V_{CC}/GND current		I_{CC}/I_{GND}	± 100	mA
Storage temperature		T_{stg}	-65~150	°C

Recommended Operating Conditions

Characteristic	Symbol	Rating	Unit
Power supply voltage	V_{CC}	2.0~3.6	V
Control pin input voltage	V_{IN}	0~3.6	V
Switch I/O voltage	V_S	0~ V_{CC}	V
Operating temperature	T_{opr}	-40~85	°C
Input rise and fall time	dt/dv	0~10	ns/V

Electrical Characteristics

DC Characteristics (Ta = -40 to 85°C)

Characteristic	Symbol	Test Condition	V _{CC} (V)	Min	Typ.	Max	Unit
High-level control input voltage	V _{IH}	—	2.0 to 3.6	$0.7 \times V_{CC}$	—	—	V
Low-level control input voltage	V _{IL}	—	2.0 to 3.6	—	—	$0.3 \times V_{CC}$	
Control input current	I _{IN}	V _{IN} = 0 to 3.6 V	2.0 to 3.6	—	—	±1.0	μA
Power off leakage current	I _{OFF}	$\overline{OE}$ = 0 to 3.6 V	0	—	—	±1.0	μA
Off-stage leakage current (switch off)	I _{SZ}	A, B = 0 to V _{CC} , $\overline{OE}$ = V _{CC}	2.0 to 3.6	—	—	±1.0	μA
Switch ON-resistance (Note 2)	R _{ON}	V _{IS} = 0 V, I _{IS} = 30 mA (Note 1)	3.0	—	2	7	Ω
		V _{IS} = 3.0 V, I _{IS} = 30 mA (Note 1)	3.0	—	3	9	
		V _{IS} = 2.4 V, I _{IS} = 15 mA (Note 1)	3.0	—	5	15	
		V _{IS} = 0 V, I _{IS} = 24 mA (Note 1)	2.3	—	3	10	
		V _{IS} = 2.3 V, I _{IS} = 24 mA (Note 1)	2.3	—	4	15	
		V _{IS} = 2.0 V, I _{IS} = 15 mA (Note 1)	2.3	—	9	25	
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND, I _{OUT} = 0	3.6	—	—	10	μA

Note 1: All typical values are at Ta = 25°C.

Note 2: Measured by voltage drop between A and B pins at indicated current through the switch. ON-resistance is determined by the lower of the voltages on the two pins (A or B).

AC Characteristics (Ta = -40 to 85°C)

Characteristic	Symbol	Test Condition	V _{CC} (V)	Min	Max	Unit
Propagation delay (bus to bus)	t _{pLH} t _{pHL}	Figure 1, Figure 2 (Note 3)	3.3 ± 0.3	—	0.31	ns
			2.5 ± 0.2	—	0.52	
Output enable time	t _{pZL} t _{pZH}	Figure 1, Figure 3	3.3 ± 0.3	—	7	ns
			2.5 ± 0.2	—	10	
Output disable time	t _{pLZ} t _{pHZ}	Figure 1, Figure 3	3.3 ± 0.3	—	8	ns
			2.5 ± 0.2	—	9	

Note 3: This parameter is guaranteed by design but is not tested. The bus switch contributes no propagation delay other than the RC delay of the typical ON-resistance of the switch and the 50 pF load capacitance when driven by an ideal voltage from the source (zero output impedance).

Capacitance (Ta = 25°C)

Characteristic	Symbol	Test Condition	V _{CC} (V)	Typ.	Unit
Control input capacitance	C _{IN}		3.0	3	pF
Switch terminal capacitance	C _{I/O}	$\overline{OE}$ = V _{CC}	3.0	23	pF

AC Test Circuit

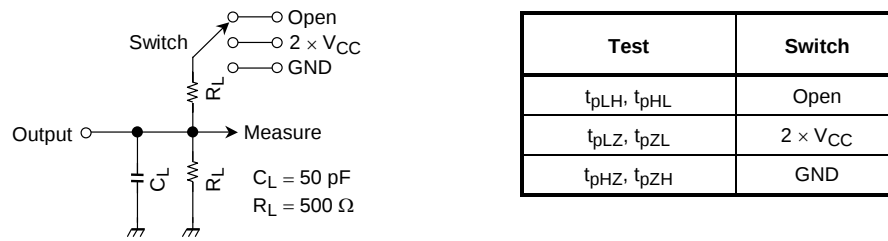


Figure 1

AC Waveforms

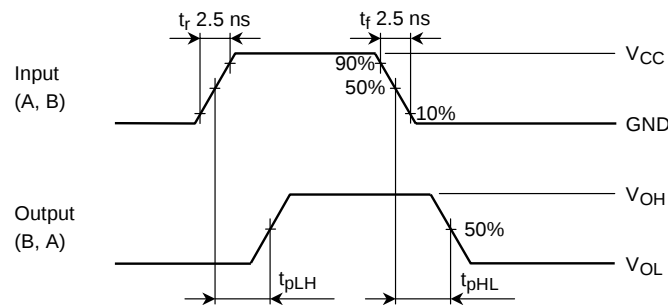


Figure 2 t_{pLH} , t_{pHL}

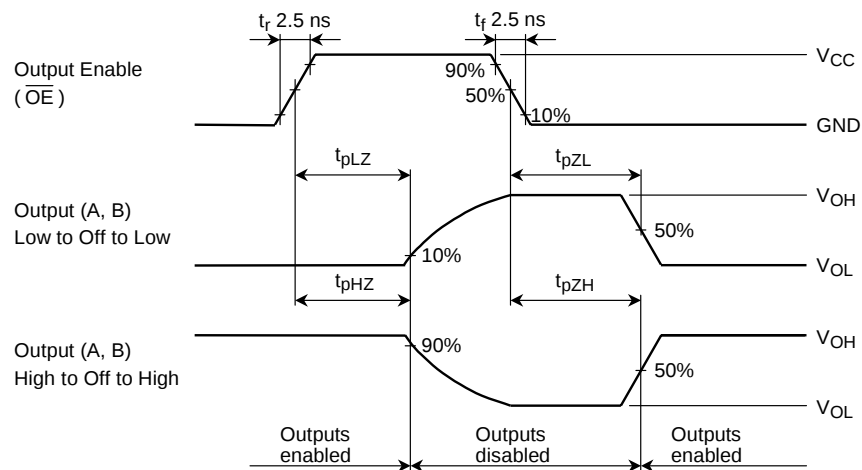
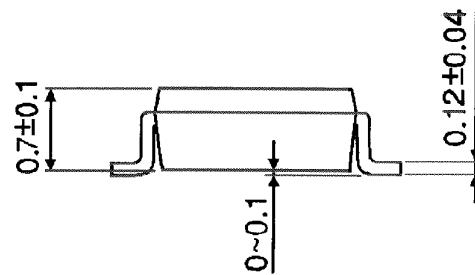
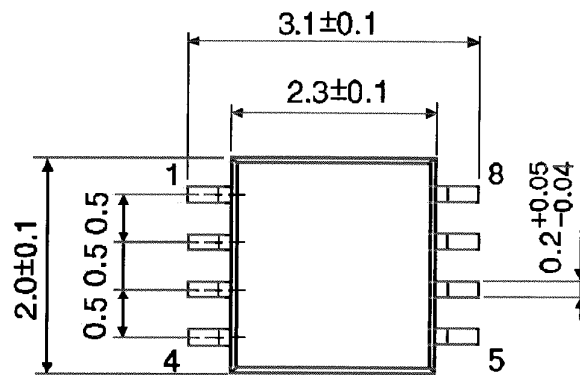


Figure 3 t_{pLZ} , t_{pHZ} , t_{pZL} , t_{pZH}

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.