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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



2-Bit Bus Switch with Individual Enables

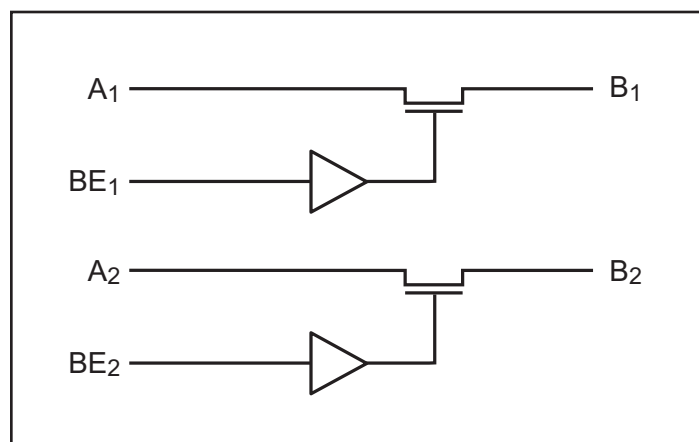
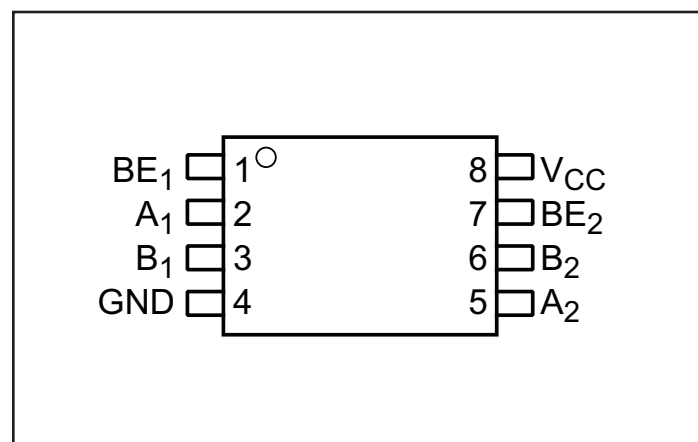
Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra Low Quiescent Power (0.2μA typical)
 - Ideally suited for notebook applications
- Packaging (Pb-free & Green available):
 - 8-pin 173-mil wide plastic TSSOP (L)
 - 8-pin 118-mil wide plastic MSOP (U)

Description

Pericom Semiconductor’s PI5C3305 is a 2-bit bus switch designed with two individual 5Ω switches with fast individual enables. When enabled via the associated Bus Enable (BE) pin, the “A” pin is directly connected to the “B” pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI5C3305 device has active HIGH enables.

Block Diagram

Pin Configuration

Pin Description

Pin Name	Description
BE _n	Switch Enable
A ₂ -A ₁	Bus A
B ₂ -B ₁	Bus B
V _{CC}	Power
GND	Ground

Truth Table⁽¹⁾

BE _n	A _n	B _n	V _{CC}	Function
X ⁽²⁾	Hi-Z	Hi-Z	GND	Disconnect
L	Hi-Z	Hi-Z	V _{CC}	Disconnect
H	B _n	A _n	V _{CC}	Connect

Notes:

1. H = High Voltage Level, L = Low Voltage Level
Hi-Z = High Impedance, X = Don't Care
2. A pull-up resistor should be provided for power-up protection.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature	-65°C to +150°C
Ambient Temperature with Power Applied	-40°C to +85°C
Supply Voltage to Ground Potential	-0.5V to +7.0V
DC Input Voltage	-0.5V to +7.0V
DC Output Current.....	120mA
Power Dissipation.....	0.5W

Note:

Stresses greater than those listed under 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.

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 4\text{V}$ to 5.5V)

Parameters	Description	Test Conditions ⁽¹⁾	Min.	Typ ⁽²⁾	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0		V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level		-0.5	0.8	
I_{IH}	Input HIGH Current	$V_{CC} = \text{Max.}, V_{IN} = V_{CC}$			± 1	μA
I_{IL}	Input LOW Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND}$			± 1	
I_{OZ}	High Impedance Output Current	$0 \leq A, B \leq V_{CC}$			± 1	
I_{ON}	Low Impedance Output Current	$0 \leq A, B \leq V_{CC}$			± 1	
V_H	Input Hysteresis at Control Pins			250		mV
R_{ON}	Switch On-Resistance ⁽³⁾	$V_{CC} = 4.5\text{V}, V_{IN} = 0.0\text{V}, I_{ON} = 30\text{mA}$ or 64mA		4	7	Ω
		$V_{CC} = 4.5\text{V}, V_{IN} = 2.4\text{V}, I_{ON} = -15\text{mA}$		8	15	

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 5.0\text{V}$, $T_A = 25^\circ\text{C}$ ambient and maximum loading.
- Measured by the voltage drop between A and B pin at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the two (A, B) pins.

Capacitance ($T_A = 25^\circ\text{C}$, $f = 1\text{MHz}$)

Parameters ⁽¹⁾	Description	Test Conditions	Typ. ⁽⁴⁾	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$	3	pF
C_{OFF}	A/B Capacitance, Switch Off		5	
C_{ON}	A/B Capacitance, Switch On		10	

Notes:

- This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Units
I _{CC}	Quiescent Power Supply Current	V _{CC} = Max.	V _{IN} = GND or V _{CC}		0.1	3.0	μA
ΔI _{CC}	Supply Current per Input @ TTL HIGH		V _{IN} = 3.4V ⁽³⁾			2.5	mA

Notes:

- For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
- Typical values are at V_{CC} = 5.0V, +25°C ambient.
- Per TTL driven input (V_{IN} = 3.4V, control inputs only); A and B pins do not contribute to I_{CC}.

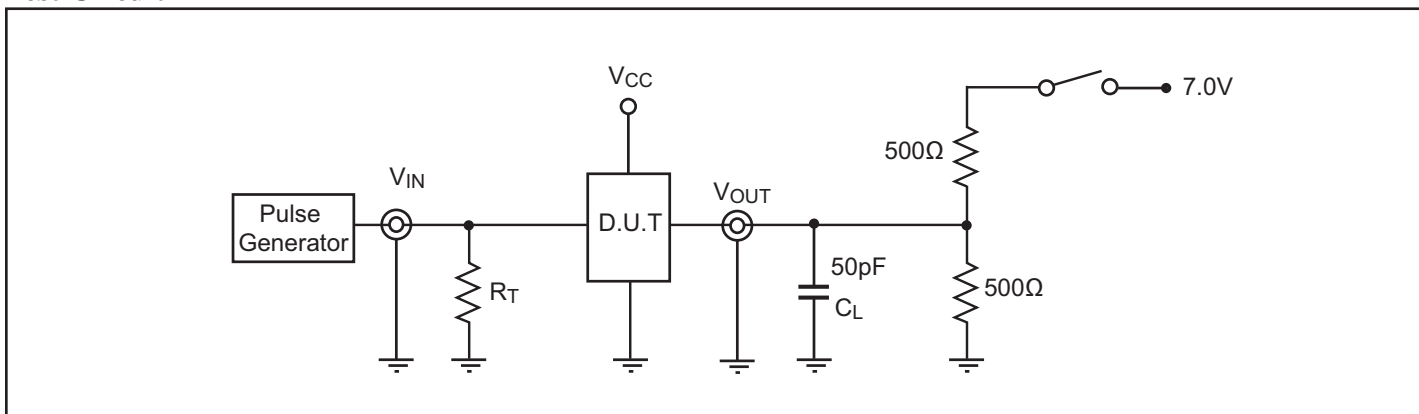
Switching Characteristics Over Operating Range

Parameters	Description	Test Conditions ⁽¹⁾	V _{CC} = 5V ± 10%		V _{CC} = 4V		Units
			Min.	Max.	Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay ^(2, 3) A to B, B to A	C _L = 50pF R _L = 500Ω		0.25		0.25	ns
t _{PZH} t _{PZL}	Bus Enable Time		1.0	4.9		5.5	
t _{PHZ} t _{PLZ}	Bus Disable Time		1.0	4.2		4.5	

Notes:

- See test circuit and waveforms.
- This parameter is guaranteed but not tested on Propagation Delays.
- The bus switch contributes no propagational delay other than the RC delay of the On-Resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns for 50pF load. Since this time constant is much smaller than the rise/fall times of typical driving signals, it adds very little propagational delay to the system. Propagational delay of the bus switch when used in a system is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

Test Circuit



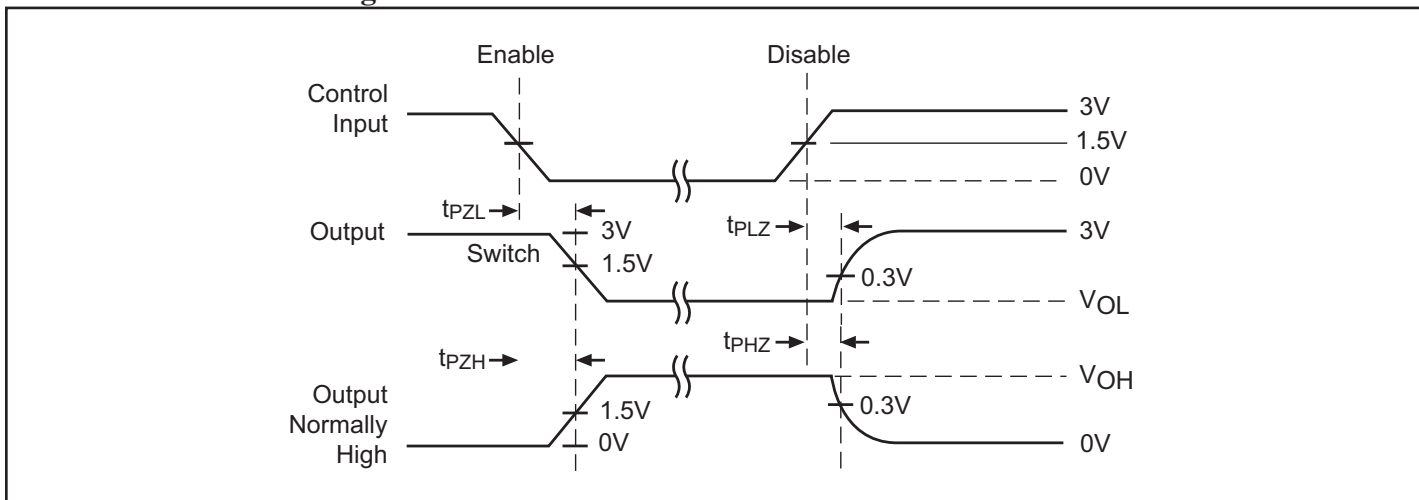
Switch Positions⁽¹⁾

Test	Switch
Open Drain Disable LOW Enable LOW	7V
All Other Inputs	Open

Notes:

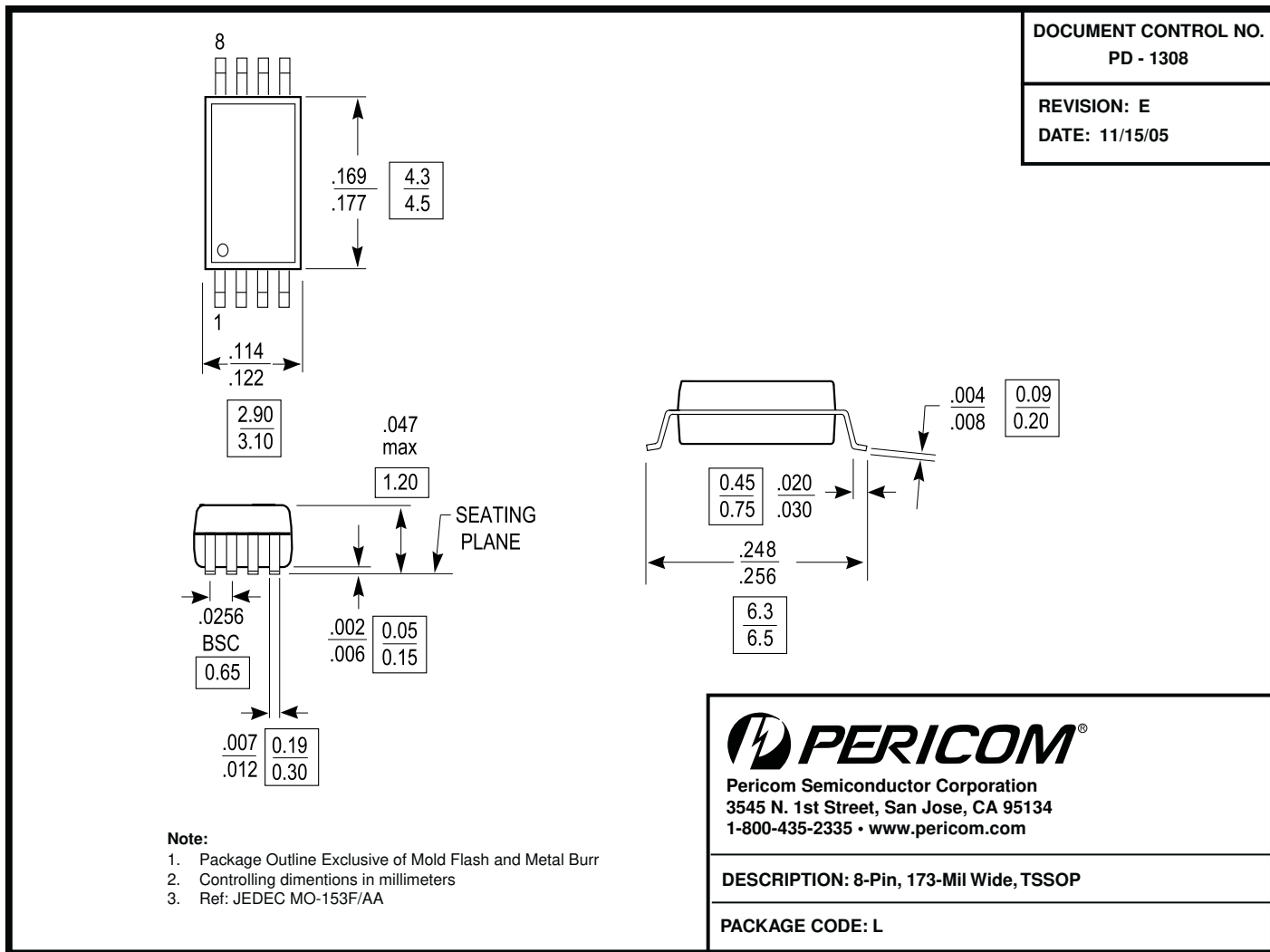
- C_L = Load Capacitance: includes jig and probe capacitance.
 R_T = Termination Resistance: should be equal to the Z_{OUT} of the Pulse Generator.

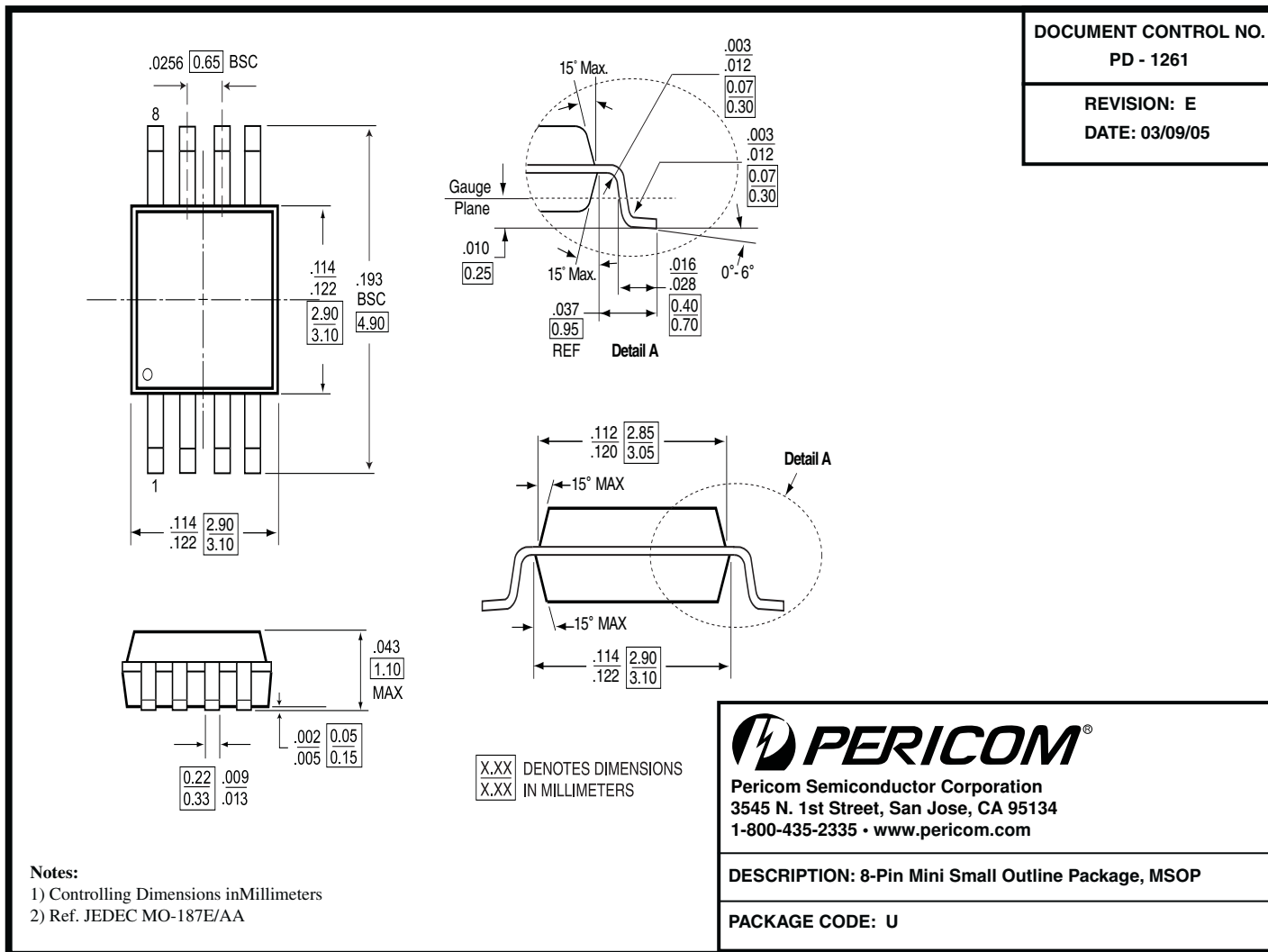
Enable and Disable Timing



Notes:

- Input Control Enable = Low; Input Control Disable = High
- Pulse Generator for All Pulses: Rate ≤ 1.0 MHz; $Z_{OUT} \leq 50\Omega$; $t_f, t_r, \leq 2.5$ ns





Note:
 • For latest package info, please check: <http://www.pericom.com/products/packaging/mechanicals.php>

Ordering Information

Ordering Code	Package Code	Package Description
PI5C3305LEX	L	Pb-free & Green, 8-Pin TSSOP
PI5C3305UEX	U	Pb-free & Green, 8-Pin MSOP

- Notes:**
- Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
 - E = Pb-free & Green
 - Adding an X suffix = Tape/Reel