Dual 4:1 Mux/DeMux Bus Switch

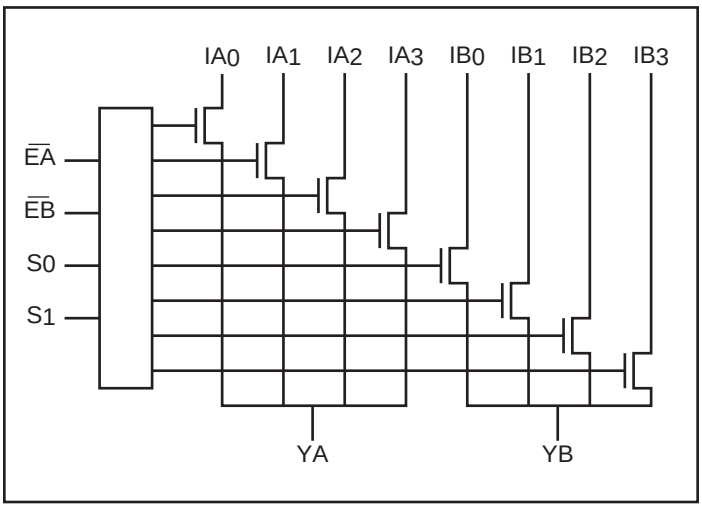
Features

- Near-Zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- ESD Protection up to 2kV HBM
- Ultra Low Quiescent Power (0.2µA typical)
  – Ideally suited for notebook applications
- Pin compatible with 74 series 253 logic devices
- Packaging (Pb-free & Green available):
  – 16-pin 150-mil wide plastic QSOP (Q)
  – 16-pin 173-mil wide plastic TSSOP (L)
  – 16-pin 150-mil wide plastic SOIC (W)

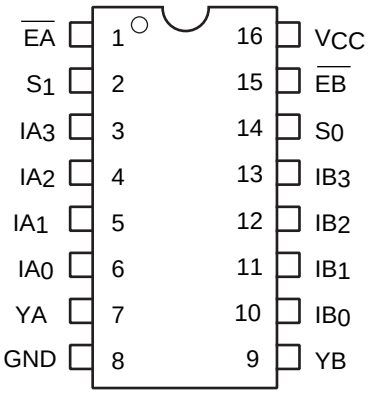
Description

Pericom Semiconductor's PI5C3253 is a Dual 4:1 Multiplexer/ demultiplexer with three-state outputs that is pinout compatible with the PI74FCT253T, 74F253, and 74ALS/AS/LS 253. Inputs can be connected to outputs with low On-Resistance (5Ω) with no additional ground bounce noise or propagation delay.

Block Diagram



Pin Configuration



Truth Table(1)

Enable		Select				
$\overline{EA}$	$\overline{EB}$	S_1	S_0	YA	YB	Function
H	X	X	X	Hi-Z	X	Disable A
X	H	X	X	X	Hi-Z	Disable B
L	L	L	L	IA_0	IB_0	S1-0 = 0
L	L	L	H	IA_1	IB_1	S1-0 = 1
L	L	H	L	IA_2	IB_2	S1-0 = 2
L	L	H	H	IA_3	IB_3	S1-0 = 3

Note:
1. H = High Voltage Level, L = Low Voltage Level

Pin Description

Pin Name	Description
IAn, IBn	Data Inputs
S0–1	Select Inputs
$\overline{EA}$, $\overline{EB}$	Enable
YA, YB	Data Outputs
GND	Ground
V_{CC}	Power

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 (Inputs & V_{CC} Only)	–0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only)	–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°C to +85°C, V_{CC} = 5V ±5%)

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} = Max., V_{IN} = V_{CC}			±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND			±1	
I_{OZH}	High Impedance Output Current	0 ≤ I_N, Y_N ≤ V_{CC}			±1	
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18mA		–0.7	–1.2	V
I_{OS}	Short Circuit Current[3]	I (Y) = 0V, Y (I) = V_{CC}	100			mA
V_H	Input Hysteresis at Control Pins			150		mV
R_{ON}	Switch On-Resistance[4]	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = 48mA		5	7	Ω
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA		10	15	

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5.0V, T_A = 25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. Measured by the voltage drop between I and Y pin at indicated current through the switch. ON resistance is determined by the lower of the voltages on the two (I,Y) pins.

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[1]	Description	Test Conditions	Typ.	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V		6	pF
C_{OFF}	I_A/I_B Capacitance, Switch Off			6	
C_{ON}	I_A/I_B Capacitance, Switch On			24	

Notes:
1. 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_{CC} = Max.	V_{IN} = 3.4V[3]			2.5	mA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., I and Y Pins Open E_X = GND Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

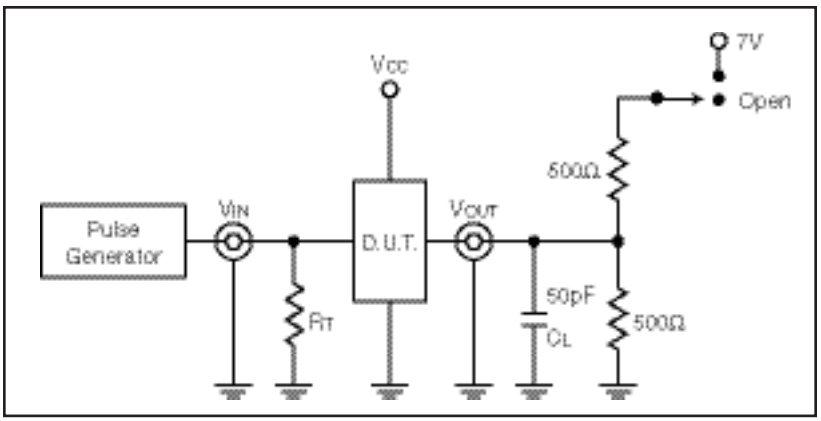
Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only); I and Y pins do not contribute to I_{CC}.
4. This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The I and Y inputs generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

Switching Characteristics over Operating Range

Param-eters	Description	Conditions[1]	Com.		Units
			Min.	Max.	
t_{IY}	Propagation Delay[2,3] In to Yn	C_L = 50pF R_L = 500Ω		0.25	ns
t_{SY}	Bus Select Time, Sn to Yn		0.5	6.6	
t_{PZH} t_{PZL}	Bus Enable Time, $\overline{E}$n to Yn		0.5	6.0	
t_{PHZ} t_{PLZ}	Bus Disable Time, $\overline{E}$n to Yn		0.5	6.0	

Notes:
1. See test circuit and waveforms.
2. This parameter is guaranteed but not tested on Propagation Delays.
3. 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



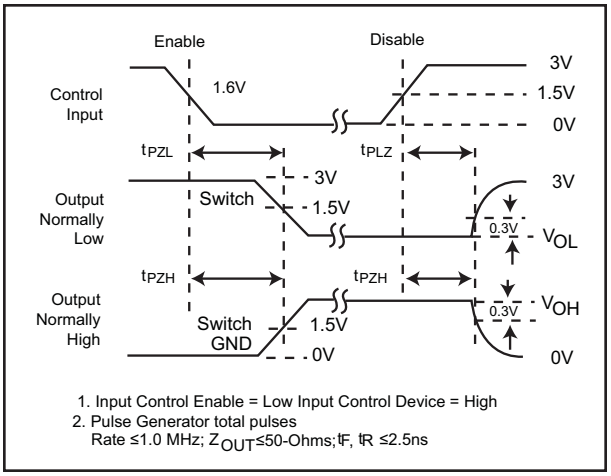
Switch Position

Test	Switch
Disable LOW	Closed
Enable LOW	Closed
t_{PD}	Open

Definitions:

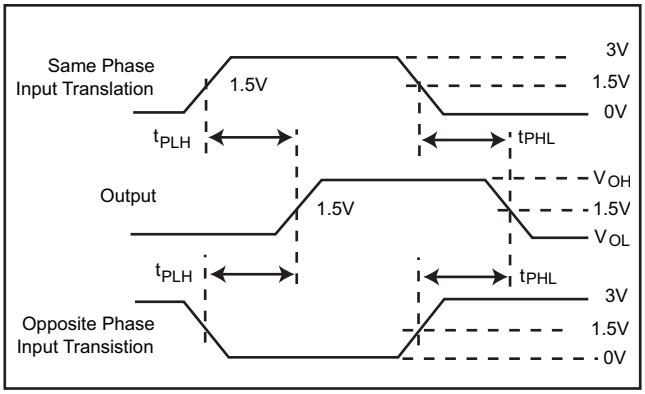
CL = Load Capacitance (includes jig and probe capacitance)
RT = Termination resistance (should be equal to ZOUT of the pulse generator)

Enable and Disable Timing Diagram



1. Input Control Enable = Low Input Control Device = High
2. Pulse Generator total pulses Rate ≤1.0 MHz; Z_{OUT}≤50-Ohms; t_F, t_R ≤2.5ns

Propagation Delay Diagram

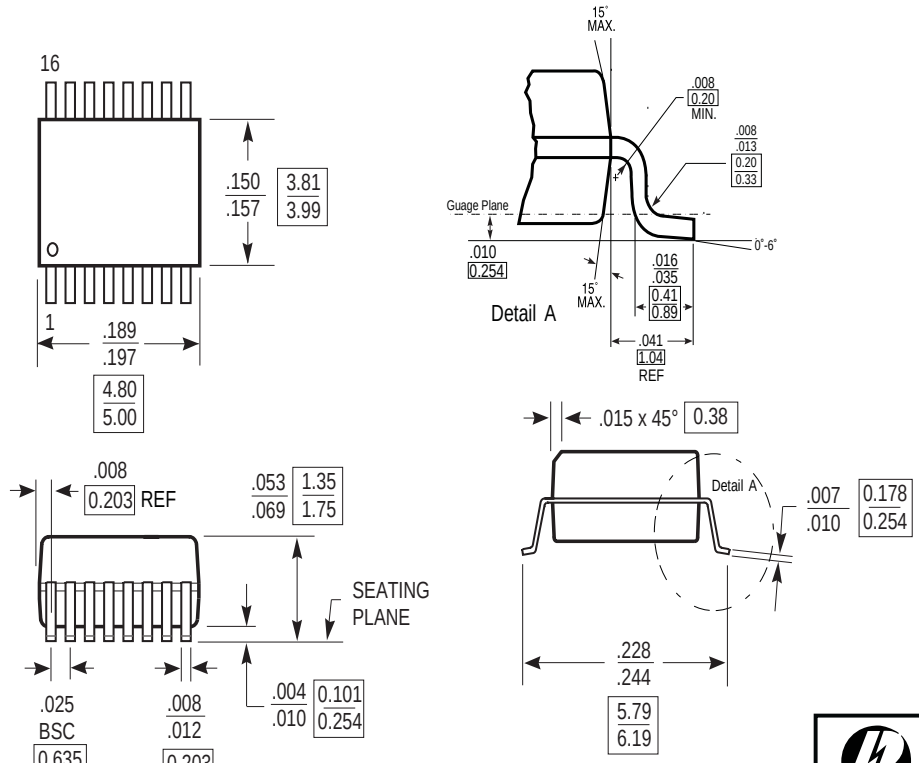


Packaging Mechanical: 16-pin QSOP (Q)

DOCUMENT CONTROL NO.
PD - 1201

REVISION: G

DATE: 11/07/07



Note:
1) Controlling dimensions in inches.
2) Ref: JEDEC MO-137B/AB.
3) Dimensions do not include mold flash, protrusions or gate burrs

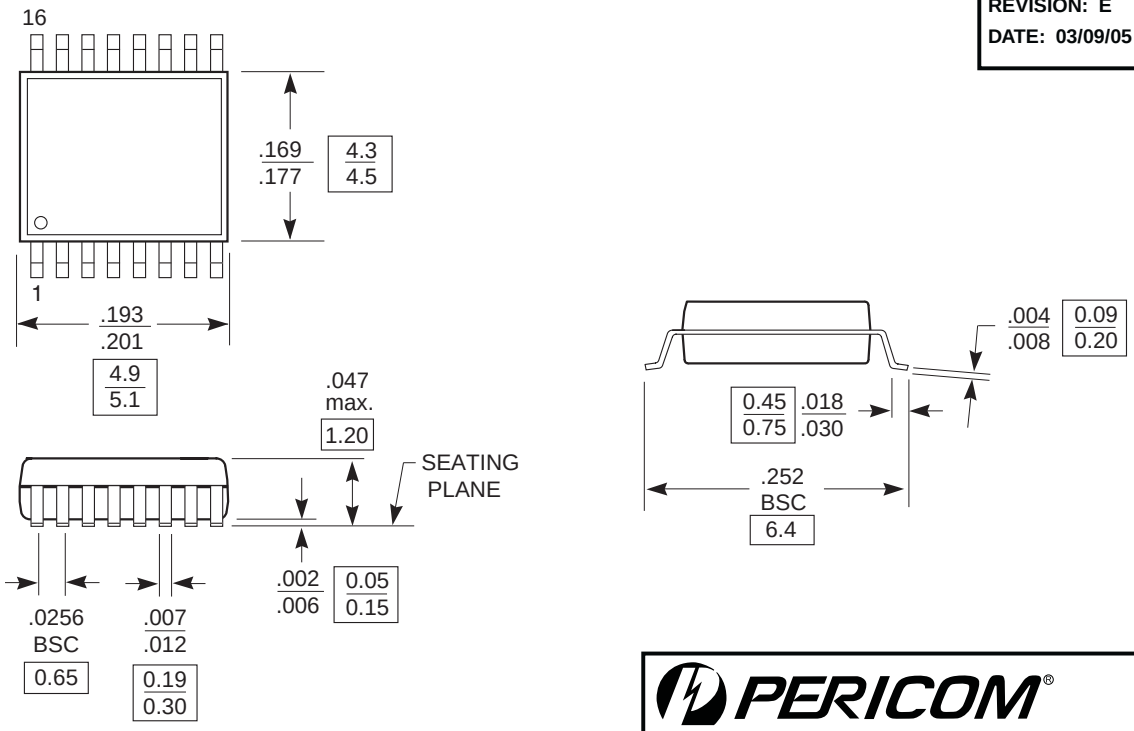
Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

DESCRIPTION: 16-Pin 150-Mil Wide QSOP

PACKAGE CODE: Q

Packaging Mechanical: 16-pin TSSOP (L)

DOCUMENT CONTROL NO. PD - 1310
REVISION: E DATE: 03/09/05



Note:
1. Package Outline Exclusive of Mold Flash and Metal Burr
2. Controlling dimentions in millimeters
3. Ref: JEDEC MO-153F/AB

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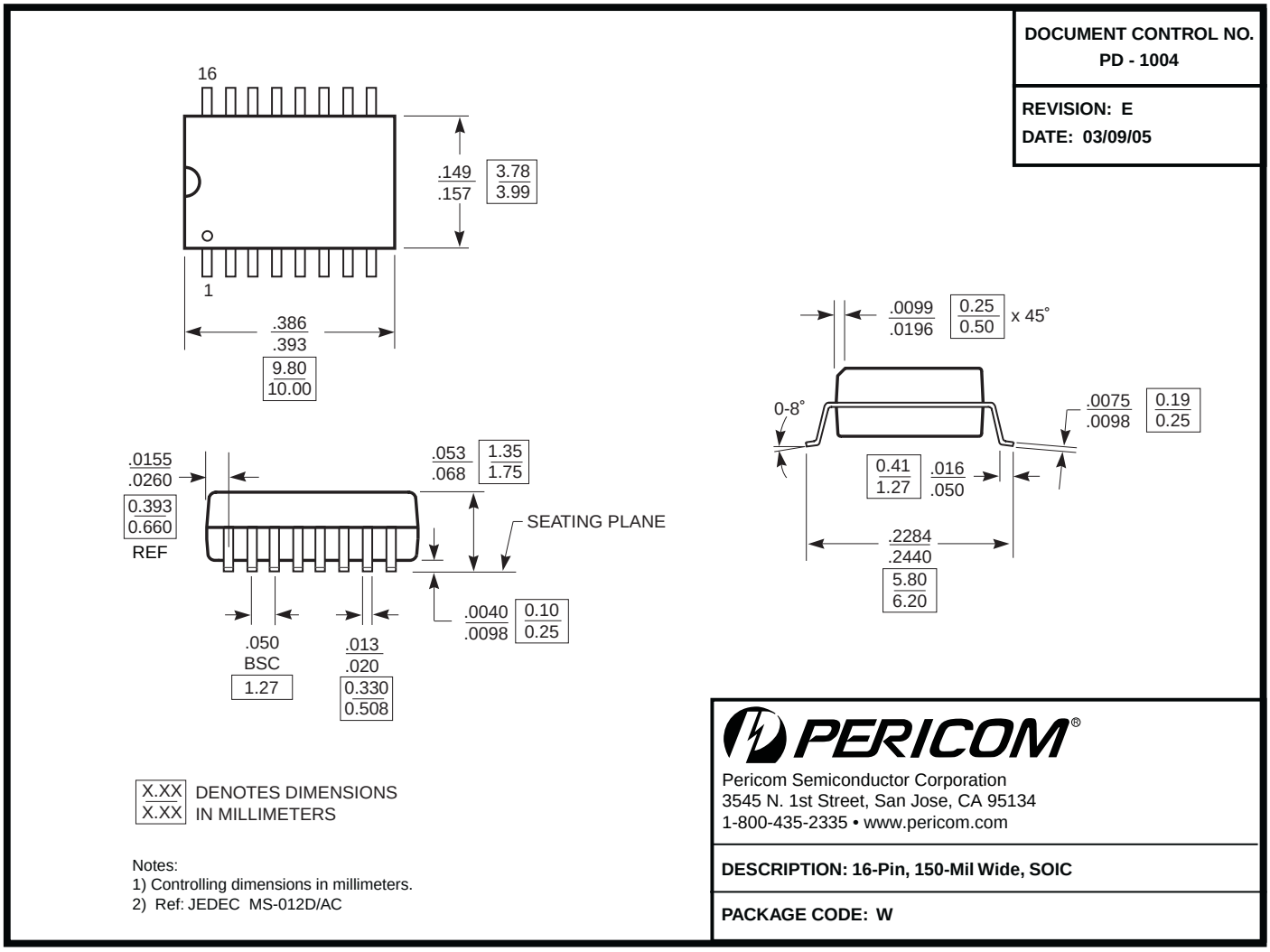
DESCRIPTION: 16-Pin, 173-Mil Wide, TSSOP

PACKAGE CODE: L

Packaging Mechanical: 16-pin SOIC (W)



Ordering Information

Ordering Code	Package Code	Package Description
PI5C3253QE	Q	Pb-free & Green, 16-pin 150-mil wide QSOP
PI5C3253LE	L	Pb-free & Green, 16-pin 173-mil wide TSSOP
PI5C3253WE	W	Pb-free & Green, 16-pin 150-mil wide SOIC

Notes:

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