

Dual 4:1 Mux/DeMux Bus Switch with -2V Undershoot Protection

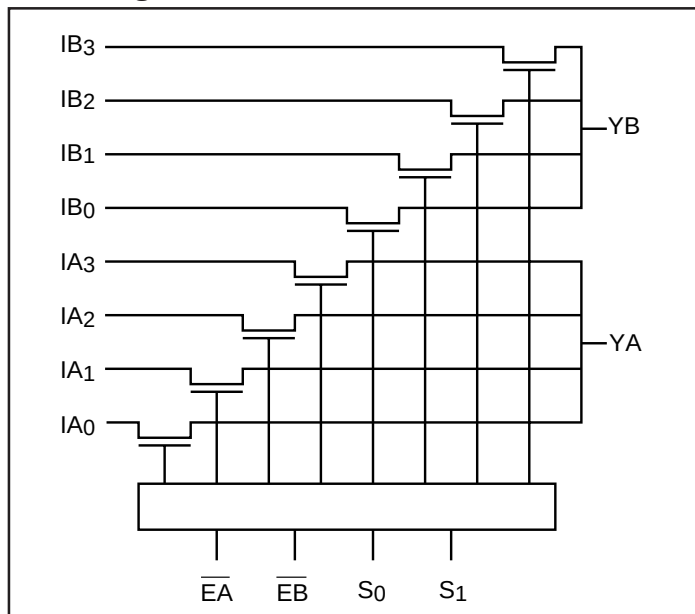
Features

- Near-Zero propagation delay
- 4-ohm switches connect inputs to outputs
- Direct bus connection when switches are ON
- Undershoot protection to -2V (Data Inputs Only)
- Pin compatible with 74 series 253 logic devices
- Packaging (Pb-free & Green available):
– 16-pin 173-mil wide plastic TSSOP (L)

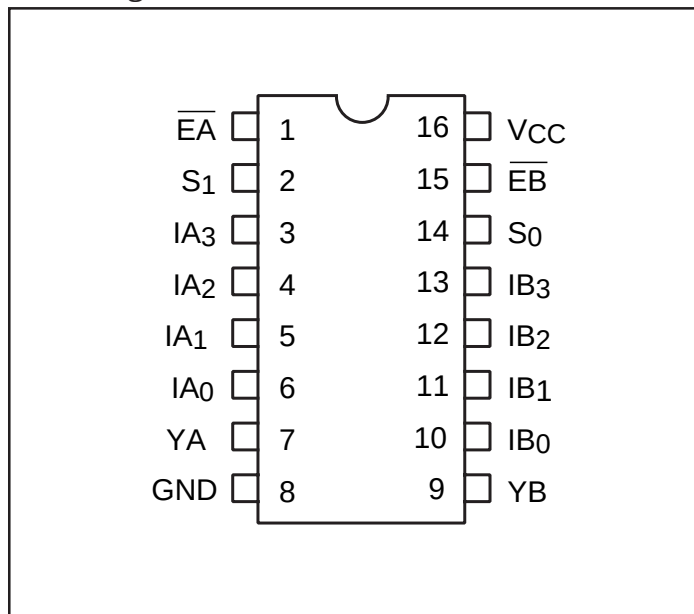
Description

Pericom Semiconductor's PI5C3253C is a Dual 4:1 multiplexer/demultiplexer with three-state outputs that is pinout compatible with the PI74FCT253T. Inputs can be connected to outputs with low On-Resistance (5-ohm) with no additional ground bounce noise or propagation delay.

Block Diagram



Pin Configuration



Pin Description

Pin Name	Description
EA, EB	Enable
S0-1	Select Inputs
1AN,1BN	Data Inputs
YA, YB	Data Outputs
VCC	Power Supply Pin
GND	Ground

Truth Table⁽¹⁾

Enable		Select		Channel		Function
EA	EB	S1	S0	YA	YB	
H	X	X	X	Hi-Z	X	Disable A
X	H	X	X	X	Hi-Z	Disable B
L	L	L	L	IA0	IB0	S1-0 = 0
L	L	L	H	IA1	IB1	S1-0 = 1
L	L	H	L	IA2	IB2	S1-0 = 2
L	L	H	H	IA3	IB3	S1-0 = 2

Note: 1. H = High Logic Voltage Level
L = Low Logic Voltage Level
Hi-Z = High Impedance

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 $+85^{\circ}\text{C}$, $V_{CC} = 5\text{V} \pm 5\%$)

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	V
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	μA
I_{OZH}	High Impedance Output Current	$0 \leq I_N, Y_N \leq V_{CC}$			± 1	μA
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$		-0.7	-1.8	V
V_{UP}	Undershoot Protection Voltage ⁽³⁾	Max Inputs, Undershoot Pulse Duration <25ns			-2.0	V
R_{ON}	Switch On Resistance ⁽⁴⁾	$V_{CC} = \text{Min.}, V_{IN} = 0.0\text{V}, I_{ON} = 48\text{mA}$ $V_{CC} = \text{Min.}, V_{IN} = 2.4\text{V}, I_{ON} = 15\text{mA}$		4 8	7 15	ohm

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

Parameters ⁽⁵⁾	Description	Test Conditions	Typ.	Max.	Units
C_{IN}	Input Capacitance	$V_{IN} = 0\text{V}$		6	pF
C_{OFF}	I_A/I_B Capacitance, Switch Off	$V_{IN} = 0\text{V}$		6	pF
C_{ON}	I_A/I_B Capacitance, Switch On	$V_{IN} = 0\text{V}$		14	pF

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.
- On 1AN & 1BN (Data Inut) pins only.
- 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.
- 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}	—	—	100	μA
ΔI _{CC}	Supply Current per Input @ TTL HIGH		V _{IN} = 3.4V ⁽³⁾	—	—	2.5	mA

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}.

Switching Characteristics over Operating Range

Parameters	Description	Conditions ⁽¹⁾	PI5C3253C		Units
			Com.		
			Min.	Max.	
t _{IY}	Propagation Delay ^(2,3) In to Y _n	C _L = 50pF R _L = 500 ohms		0.25	ns
t _{SY}	Bus Select time S _n to Y _n		0.5	4.5	
t _{PZH} t _{PZL}	Bus Enable Time Ē _n to Y _n		0.5	4.0	
t _{PHZ} t _{PLZ}	Bus Disable Time Ē _n to Y _n		0.5	4.5	

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.

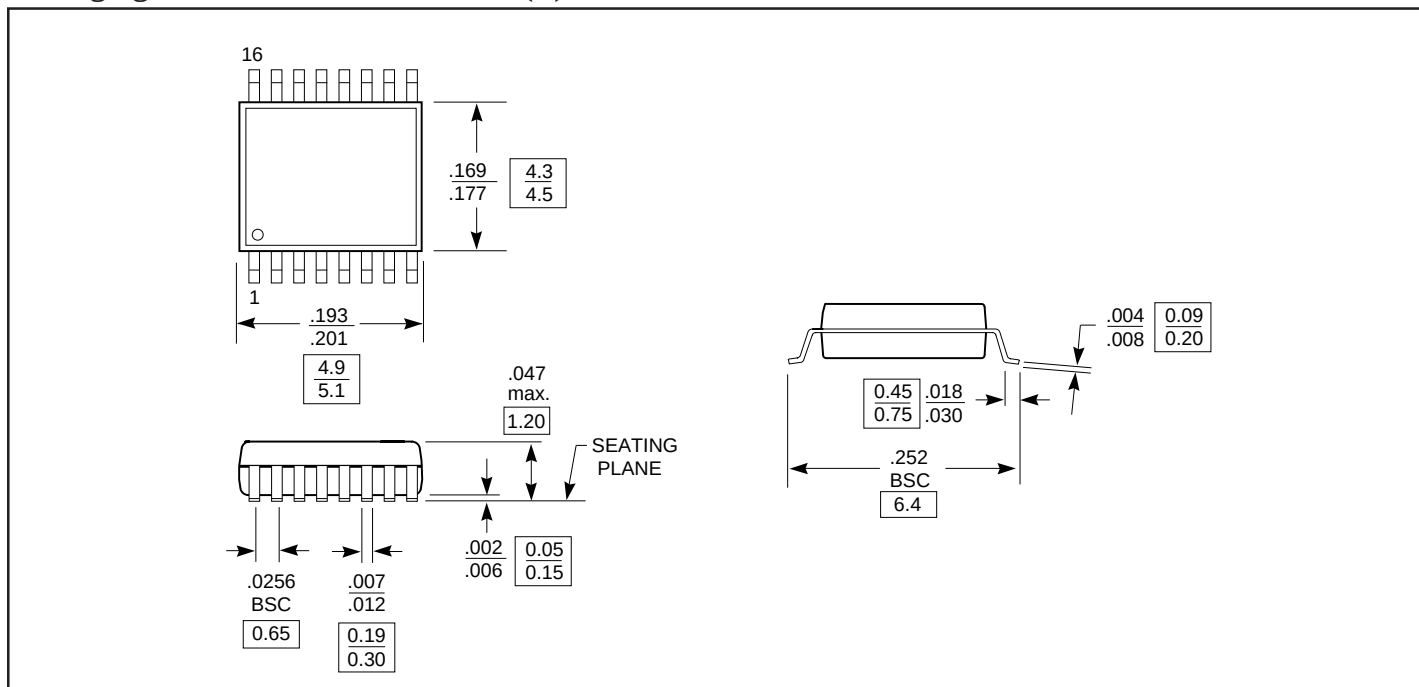
Application Information

Logic Inputs

Logic control inputs can be driven up to +5.5V regardless of the supply voltage. For example, given a 5.0V supply, the control or select pins may be driven low to 0V and high to 5.5V. Driving the control or select pins Rail-to-Rail® minimizes power consumption.

Power -Supply Sequencing

Proper power-supply sequencing is recommended for all CMOS devices. Always apply V_{CC} before applying signals to the input/output or control pins.

Packaging Mechanical: 16-Pin TSSOP (L)

Ordering Information

Ordering Code	Package Code	Package Type
PI5C3253CL	L	16-pin 150-mil wide plastic TSSOP
PI5C3253CLE	L	Pb-free & Green, 16-pin 150-mil wide plastic TSSOP

Notes:

- Thermal characteristics can be found on the company web site at www.pericom.com/packaging/