Quad Analog Switch with Individual Enables

Product Features:

- Near zero propagation delay
- 5Ω switches connect inputs to outputs
- Direct bus connection when switches are ON
- Ultra Low Quiescent Power (0.2 µA Typical) – Ideally suited for notebook applications
- Packages available:
  - 14-pin 150 mil wide plastic SOIC (W14)
  - 16-pin 150 mil wide plastic QSOP (Q16)

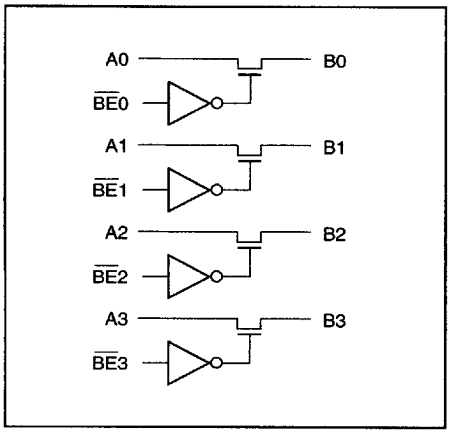
Product Description:

Pericom Semiconductor's PI5C series of logic circuits are produced using the Company's advanced 0.8 micron CMOS technology, achieving industry leading speed grades.

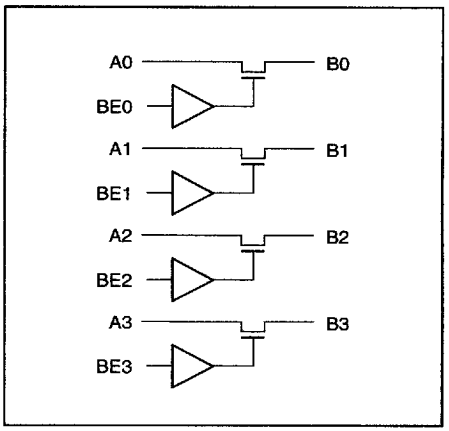
The PI5C3125 and PI5C3126 are quad analog and digital switches designed with four individual 5Ω bus switches with fast indiviual enables in an industry standard 74XX125/126 pinout. When enabled via the associated Bus Enable ($\overline{BE}$) pin, the "A" pin is directly connected to the "B" pin for that particular gate. The bus switch introduces no additional propagation delay or additional ground bounce noise.

The PI5C3125 device has active LOW enables, and the PI5C3126 has active HIGH enables.

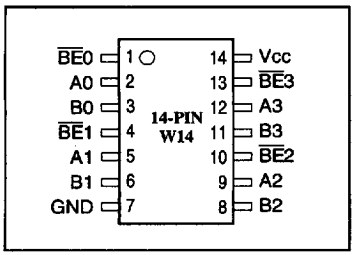
PI5C3125 Logic Block Diagram



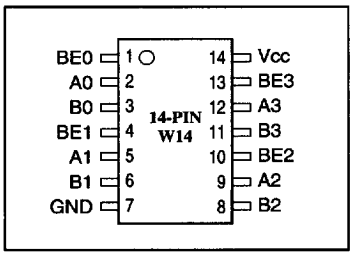
PI5C3126 Logic Block Diagram



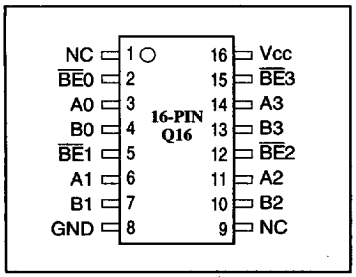
PI5C3125 14-Pin Product Pin Configuration



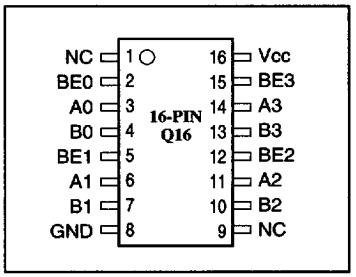
PI5C3126 14-Pin Product Pin Configuration



PI5C3125 16-Pin Product Pin Configuration



PI5C3126 16-Pin Product Pin Configuration



Product Pin Description

Pin Name	Description
$\overline{BE}$n	Switch Enable (PI5C3125)
BEn	Switch Enable (PI5C3126)
A3-A0	Bus A
B3-B0	Bus B
Vcc	Power
GND	Ground

Truth Table[1]

PI5C3125 $\overline{BE}$n	PI5C3126 BEn	An	Bn	Vcc	Function
X*	X	Hi-Z	Hi-Z	GND	Disconnect
H	L	Hi-Z	Hi-Z	Vcc	Disconnect
L	H	Bn	An	Vcc	Connect

Notes:
1. H = High Voltage Level, L = Low Voltage Level
   HI-Z = High Impedance, X = Don't Care
* 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	–55°C to +125°C
Ambient Temperature with Power Applied	–40°C to +85°C
Supply Voltage to Ground Potential (Inputs & Vcc 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	120 mA
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	V
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	µA
I_{OZH}	High Impedance Output Current	0 ≤ A, B ≤ V_{CC}			±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18 mA		–0.7	–1.2	V
I_{OS}	Short Circuit Current[3]	A (B) = 0 V, B (A) = 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} = 48 mA V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15 mA		5 10	7 15	Ω

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters[5]	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V		6	pF
C_{OFF}	A/B Capacitance, Switch Off	V_{IN} = 0V		6	pF
C_{ON}	A/B Capacitance, Switch On	V_{IN} = 0V		8	pF

Notes:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 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 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.
5. 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., A and B Pins Open $\overline{BE}_N/BE_N$ = GND Control Input Toggling 50% Duty Cycle				0.25	mA/ MHz

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

PI5C3125 Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	PI5C3125 Com. Min	PI5C3125 Com. Max	Unit
t_{PLH} t_{PHL}	Propagation Delay[2,3] A to B, B to A	C_L = 50 pF R_L = 500Ω		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time		0.5	6.6	ns
t_{PHZ} t_{PLZ}	Bus Disable Time		0.5	6.0	ns

PI5C3126 Switching Characteristics over Operating Range

Parameters	Description	Conditions[1]	PI5C3126 Com. Min	PI5C3126 Com. Max	Unit
t_{PLH} t_{PHL}	Propagation Delay[2,3] A to B, B to A	C_L = 50 pF R_L = 500Ω		0.25	ns
t_{PZH} t_{PZL}	Bus Enable Time		0.5	6.6	ns
t_{PHZ} t_{PLZ}	Bus Disable Time		0.5	6.0	ns

Notes:
1. See test circuit and wave forms.
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 0.25 ns for 50 pF 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.