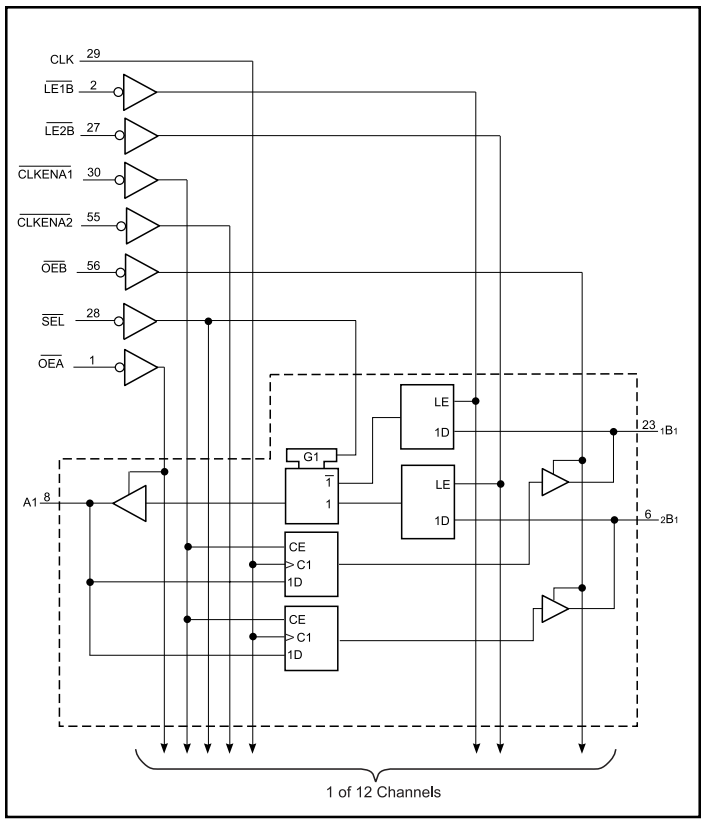
PI74ALVCH16271

12-Bit To 24-Bit Multiplexed Bus Exchanger with 3-State Outputs

Product Features

- PI74ALVCH16271 is designed for low voltage operation, V_{CC} = 2.3V to 3.6V
- Hysteresis on all inputs
- Typical V_{OLP} (Output Ground Bounce) < 0.8V at V_{CC} = 3.3V, T_A = 25°C
- Typical V_{OHV} (Output V_{OH} Undershoot) < 2.0V at V_{CC} = 3.3V, T_A = 25°C
- Bus Hold retains last active bus state during 3-State, eliminating the need for external pullup resistors
- Industrial operation at –40°C to +85°C
- Packages available:
  – 56-pin 240 mil wide plastic TSSOP (A56)
  – 56-pin 300 mil wide plastic SSOP (V56)

Logic Block Diagram



Product Description

Pericom Semiconductor's PI74AVC series of logic circuits are produced using the Company's advanced 0.35 micron CMOS technology, achieving industry leading speed.

This 12-bit to 24-bit multiplexed bus exchanger is designed for 2.3V to 3.6V V_{CC} operation.

The PI74ALVCH16271is intended for applications in which two separate data paths must be multiplexed onto, or demultiplexed from, a single data path. This device is particularly suitable as an interface between conventional DRAMs and high-speed microprocessors

Data is stored in the internal A-to-B registers on the low-to-high transition of the clock (CLK) input, provided clock-enable ($\overline{CLKENA}$) inputs are low. Proper control of these inputs allows two sequential 12-bit words to be presented as a 24-bit word on the B port.

To maximize memory access throughput, transparent latches in the B-to-A path allow asynchronous operation. These latches transfer data when the latch-enable ($\overline{LE}$) inputs are low. The select ($\overline{SEL}$) line selects 1B or 2B data for the A outputs. Data flow is controlled by the active-low output enables ($\overline{OEA}$, $\overline{OEB}$).

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor, the minimum value of the resistor is determined by the current-sinking capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

Product Pin Description

Pin Name	Description
$\overline{OE}$	Output Enable Input (Active LOW)
CLK	Clock
$\overline{SEL}$	Select (Active Low)
$\overline{CLKEN}$	Clock Enable (Active Low)
A,1B,2B	3-State Outputs
GND	Ground
V_{CC}	Power

Truth Tables(1)

Output Enable

INPUTS		OUTPUTS	
$\overline{OEA}$	$\overline{OEB}$	A	1B,2B
H	H	Z	Z
H	L	Z	Active
L	H	Active	Z
L	L	Active	Active

A to B STORAGE ($\overline{OEB}$ = L)

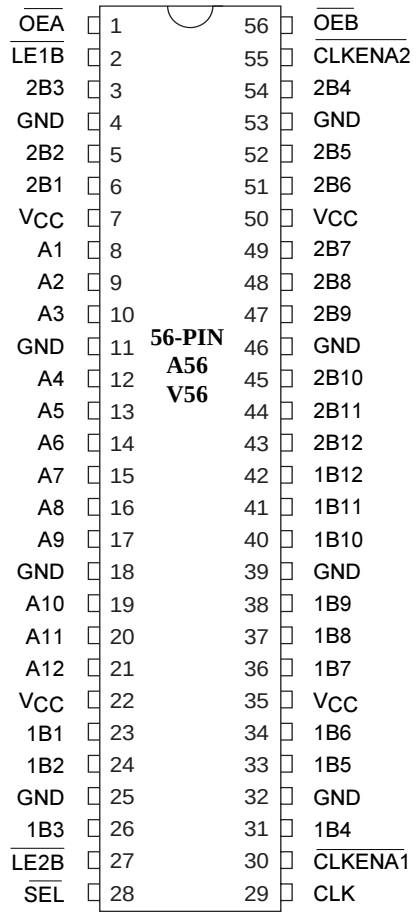
INPUTS				OUTPUTS	
$\overline{CLKENA1}$	$\overline{CLKENA2}$	CLK	A	1B	2B
H	H	X	X	$1B0^{(2)}$	$2B0^{(2)}$
L	X	↑	L	L	X
L	X	↑	H	H	X
X	L	↑	L	X	L
X	L	↑	H	A_O	H

B to A STORAGE ($\overline{OEA}$ = L)

INPUTS				Outputs A
$\overline{LE}$	$\overline{SEL}$	1B	2B	
H	X	X	X	$A_O^{(2)}$
H	X	X	X	$A_O^{(2)}$
L	H	L	X	L
L	H	H	X	H
L	L	X	L	L
L	L	X	H	H

Notes:
1. H = High Signal Level, L = Low Signal Level
   X = Irrelevant, Z = High Impedance
   ↑ = Transition, Low to High
2. Output level before the indicated steady state input conditions were established.

Product Pin Configuration



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Maximum Ratings

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

Storage Temperature	–65°C to +150°C
Supply Voltage Range, V_{CC}	–0.5V to 4.6V
Input Voltage Range, V_I :	
Except I/O ports (See Note 1):	–0.5V to 4.6V
I/O ports (See Notes 1 and 2)	–0.5V to V_{CC} + 0.5V
Output Voltage Range, V_O (See Notes 1and 2)	–0.5V to V_{CC} + 0.5V
Input Clamp current, I_{IK} (V_I < 0)	–50mA
Output Clamp current, I_{OK} (V_O < 0 or V_O > V_{CC})	±50mA
Continous Output Current, I_O (V_O = 0 to V_{CC})	±50mA
Continous Current through each V_{CC} or GND	±100mA
Maximum Power Dissipation:	
A package	1W
V package	1.4W

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.

Notes:
1. The input and output negative-voltage ratings maybe exceeded if the input and outputclamp-current ratings are observed.
2. This value is limited to 4.6V maximum.

DC Electrical Characteristics (Over the Operating Range, T_A = –40°C to +85°C, V_{CC} = 3.3V ± 10%)

Parameters	Description	Test Conditions[3]	Min.	Typ.	Max.	Units
V_{CC}	Supply Voltage		2.3		3.6	V
V_{IH}	Input HIGH Voltage	V_{CC} = 2.3V to 2.7V	1.7			
		V_{CC} = 2.7V to 3.6V	2.0			
V_{IL}	Input LOW Voltage	V_{CC} = 2.3V to 2.7V			0.7	
		V_{CC} = 2.7V to 3.6V			0.8	
V_{IN}	Input Voltage		0		V_{CC}	
V_{OUT}	Output Voltage		0		V_{CC}	
I_{OH}	HIGH-level Output Current	V_{CC} = 2.3V			-12	mA
		V_{CC} = 2.7V			-12	
		V_{CC} = 3.0V			-24	
I_{OL}	LOW-level Output Current	V_{CC} = 2.3V			12	
		V_{CC} = 2.7V			12	
		V_{CC} = 3.0V			24	

Note:
3. Unused control inputs must be held HIGH or LOW to prevent them from floating.

DC Electrical Characteristics-Continued (Over the Operating Range, T_A = -40ºC to +85ºC, V_{CC} = 3.3V ± 10%

Parameters	Test Conditions		V_{CC}(1)	Min.	Typ.(2)	Max.	Units
V_{OH}	I_{OH} = -100µA		Min. toMax.	V_{CC} -0.2			V
	I_{OH} = -6mA	V_{IH} = 1.7V	2.3V	2.0			
	I_{OH} = -12mA	V_{IH} = 1.7V	2.3V	1.7			
		V_{IH} = 2.0V	2.7V	2.2			
		V_{IH} = 2.0V	3.0V	2.4			
	I_{OH} = -24mA	V_{IH} = 2.0V	3.0V	2.0			
V_{OL}	I_{OL} = 100µA		Min. to Max.			0.2	
	I_{OL} = 6mA	V_{IL} = 0.7V	2.3V			0.4	
	I_{OL} = 12mA	V_{IL} = 0.7V	2.3V			0.7	
		V_{IL} = 0.8V	2.7V			0.4	
	I_{OL} = 24mA	V_{IL} = 0.8V	3.0V			0.55	
I_I	V_I = V_{CC} or GND		3.6V			±5	µA
I_I (Hold)	V_I = 0.7V		2.3V	45			
	V_I = 1.7V			-45			
	V_I = 0.8V		3.0V	75			
	V_I = 2.0V			-75			
	V_I = 0 to 3.6V(3)		3.6V			±500	
I_{OZ}(4)	V_O = V_{CC} or GND		3.6V			±10	
I_{CC}	V_I = V_{CC} or GND, I_O = 0		3.6V			40	
ΔI_{CC}	One input at V_{CC} - 0.6V, Other inputs at V_{CC} or GND		3V to 3.6V			750	
C_I Control Inputs	V_I = V_{CC} or GND		3.3V		3.5		pF
C_{IO} A or B Ports	V_O = V_{CC} or GND		3.3V		9		

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} = 3.3V, +25ºC ambient and maximum loading.
3. Bus hold maximum dynamic current required to switch the input from one state to another
4. For I/O ports, the I_{OZ} includes the input leakage current.

Timing Requirements over Operating Range

Parameters	Description		V_{CC}= 2.5 V ± 0.2 V		V_{CC}= 2.7 V		V_{CC}= 3.3 V ± 0.3 V		Units
			Min.	Max.	Min.	Max.	Min.	Max.	
f_{CLOCK}	Clock frequency		0	130	0	130	0	130	Mhz
t_W	Pulse duration, CLK high or Low		3.3		3.3		3.3		ns
t_{SU}	Setup time	A before CLK↑	2.6		2.1		1.7		
		B before $\overline{LE}$	1.7		1.5		1.3		
		$\overline{CLKEN}$ before CLK↑	1.6		1.3		1.0		
t_H	Hold time	A after CLK↑	0.6		0.6		0.7		
		B after $\overline{LE}$	0.9		0.9		1.1		
		$\overline{CLKEN}$ after CLK↑	1.0		0.9		0.9		
$\Delta t/\Delta v$(1)	Input Transition Rise or Fall		0	10	0	10	0	10	ns/V

Notes:
1. Unused control inputs must be held HIGH or LOW to prevent them from floating.

Switching Characteristics over Operating Range(1)

Parameters	From (INPUT)	To (OUTPUT)	V_{CC} = 2.5V ± 0.2V		V_{CC} = 2.7V		V_{CC} = 3.3V ± 0.3V		Units
			Min.(2)	Max.	Min.(2)	Max.	Min.(2)	Max.(2)	
f_{MAX}			130		130		130		MHz
t_{PD}	CLK	B	1.0	6.2		5.0	1.0	4.3	ns
t_{PD}	B	A	1.0	5.3		4.7	1.4	4.0	
t_{PD}	$\overline{LE}$	A	1.0	6.0		5.9	1.4	4.8	
t_{PD}	$\overline{SEL}$	A	1.1	6.4		6.2	1.3	5.2	
t_{EN}	$\overline{OEB}$ or $\overline{OEA}$	B or A	1.0	6.0		6.1	1.0	5.1	
t_{DIS}	$\overline{OEB}$ or $\overline{OEA}$	B or A	1.4	5.4		4.6	1.7	4.2	

Notes:
1. Unused control inputs must be held HIGH or LOW to prevent them from floating.
2. Minimum limits are guaranteed but not tested on Propagation Delays.

Operating Characteristics, T_A= 25°C

Parameter			Test Conditions	Vcc = 2.5V ± 0.2V	Vcc = 3.3V ± 0.3V	Units
				Typical	Typical	
C_{pd} Power Dissipation Capacitance	A to B	Outputs Enabled	C_L= 50pF, f = 10 MHz	92	105	pF
		Outputs Disabled		61	76	
	B to A	Outputs Enabled		39	43	
		Outputs Disabled		11	13	