PI6CV304/PI6CV2304

160 MHz Clock Buffers

Features

- 160MHz operation
- Low noise, low skew: 150ps max
- Fast rise/fall time, 1.0ns typ.
- Fast propagation delay, 2.0ns typ.
- 5V I/O tolerant input
- Industrial temperature (–40°C to 85°C)
- 3.3V power supply
- Package:
  8-pin TSSOP (L)

Applications

- 33MHz PCI-to-133MHz PCIX controllers
- 80MHz for 100MB Ethernet
- 125MHz for Gigabit networking
- 155MHz for Optical OC3/SDH/SONET

Description

PI6CV304 and PI6CV2304 , low-skew, low- noise, high -speed clock buffers, are ideal for computing, networking, and communication applications such as PCI(X) clock buffers in servers and workstations, PCI(X) Storage Area Network (SAN), and RAID controllers. They are used for networking and communications applications requiring 80MHz for 100MB Ethernet and 125MHz for Gigabit networking clocks.

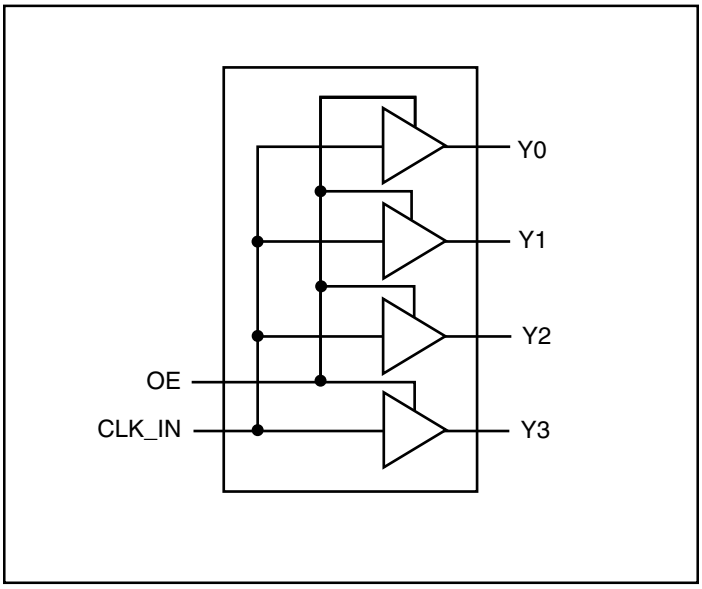
To reduce EMI emission and power consumption, all outputs can be disabled to 3-state by asserting a low signal to the OE (Output Enable) pin.

PI6CV2304 integrates 30-ohm resistors on all Y[0-3] outputs. PI6CV304 output impedance is 20 ohms.

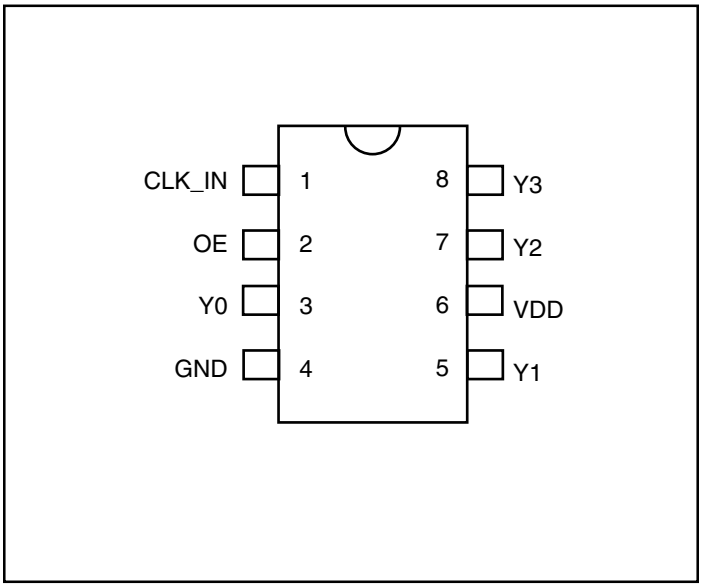
Function Table

Inputs		Output
CLK_IN	OE	Y[0:3]
X	L	L
L	H	L
H	H	H

Block Diagram



Pin Configuration



Pin Description

Pin #	Symbol	Type	Qty	Description
1	CLK_IN	Input	1	5V Tolerant clock input
2	OE	Input	1	Active High Output Enable. Y[0-3] outputs will be 3-stated when OE is low
3,5,7,8	Y[0-3]	Output	4	LVCMOS level outputs
4	GND	Ground	1	Ground
6	V_{DD}	Power	1	3.3V power

Absolute Maximum Ratings

Supply Voltage (V_{DD})	–0.0V to +5.0V
Input Voltage	–0.5V to V_{DD}+0.5V
Industrial Operating Temperature	–40°C to +85°C
Storage Temperature	–65°C to +150°C
Junction Temperature	150°C
Input ESD MIL-883, method 3015, human body model	2KV

Operating Conditions

Symbol	Description	Min	Max	Unit
V_{DD}	I/O Supply, Analog Core Supply	3.0	3.6	V
T_A	Industrial Ambient Temperature	–40	+85	°C

PI6CV304 DC Characteristics Over Operating Conditions

Symbol	Parameter	Conditions	Min	Typ.	Max	Units
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.0			
I_{IL}	Low Input Current	V_{IN} = 0V			5	µA
I_{IH}	High Input Current	V_{IN} = V_{CC}			5	
V_{OL}	Low Output Voltage	V_{CC} = 3.0V, I_{OL} = 12mA			0.4	V
V_{OH}	High Output Voltage	V_{CC} = 3.0V, I_{OH} = –12mA	2.4			
C_O	Output Capacitance				7	pF
CI	Input Capacitance				5	
I_{DD}	Supply Current	C_L = 33pF/33MHz		20		mA
		C_L = 33pF/66MHz		40		
		C_L = 22pF/80MHz		35		
		C_L = 15pF/100MHz		32		
		C_L = 10pF/125MHz		28		
		C_L = 10pF/155MHz		41		
Z_O	Output Impedance			20		Ω
L	Pin Inductance				7	nH

PI6CV304 AC Characteristics (T_A = –40~85°C, V_{CC} = 3.3V ±0.3V, 33pF/66MHz and 10pF/160MHz)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{IN}	Input frequency		0		160	MHz
t_{PLH}	Low-to-high propagation delay	CLK_IN to Y[0-3] rising edges @ 1.5V	1.0		3.0	ns
t_{PHL}	High-to-low propagation delay	CLK_IN to Y[0-3] falling edges @ 1.5V	1.0		3.0	
$t_{SK(O)}$	Output skew	@ 1.5V			150	ps
$t_{SK(P)}$	Pulse skew	@ 1.5V			300	
$t_{SK(T)}$	Package skew (1)	@ 1.5V			500	
t_R,t_F	Rise, Fall time	0.8V~2.0V			1.2	ns
t_{PZL},t_{PZH}	Output enable time				5	
t_{PLZ},t_{PHZ}	Output disable time				10	
t_{DC}	Output Duty Cycle	$t_{DC} = t_H/t_{CY}$, t_H = High Pulse Width, t_{CY} = Output Cycle Time, @ 1.5V	45		55	%

Note: (1) Identical traces, loads, power supply.

PI6CV2304 DC Characteristics Over Operating Conditions

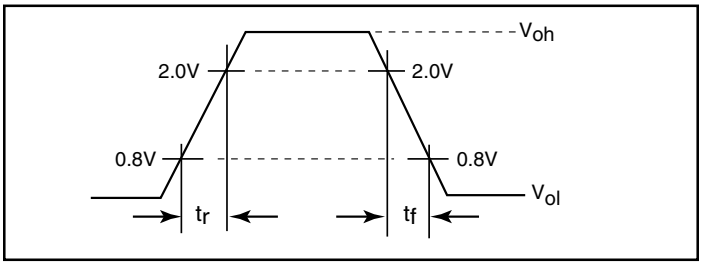
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{IL}	Low Input Voltage				0.8	V
V_{IH}	High Input Voltage		2.0			
I_{IL}	Low Input Current	V_{IN} = 0V			50	µA
I_{IH}	High Input Current	V_{IN} = V_{CC}			200	
V_{OL}	Low Output Voltage	V_{CC} = 3.0V, I_{OL}= 8 mA			0.4	V
V_{OH}	High Output Voltage	V_{CC} = 3.0V, I_{OH} = -8mA	2.4			
I_{DD}	Supply Current	C_L = 33pF/33MHz		20		mA
		C_L = 33pF/66MHz		41		
		C_L = 22pF/80MHz		35		
		C_L = 15pF/100MHz		34		
		C_L = 10pF/125MHz		31		
C_O	Output Capacitance				7	pF
C_I	Input Capacitance				5	
Z_O	Output Impedance			30		Ω
L	Pin Inductance				7	nH

PI6CV2304 AC Characteristics (T_A = –40~85°C, V_{CC} = 3.3V ±0.3V, 33pF/66MHz and 10pF/133MHz)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
f_{IN}	Input frequency		1.0		133	V
t_{PLH}	Low-to-high propagation delay	CLK_IN to Y[0-3] rising edges @ 1.5V	1.0		3.0	ns
t_{PHL}	High-to-low propagation delay	CLK_IN to Y[0-3] falling edges @ 1.5V			3.0	
$t_{SK(O)}$	Output skew	@ 1.5V			150	ps
$t_{SK(P)}$	Pulse skew	@ 1.5V			300	
$t_{SK(T)}$	Package skew (1)	@ 1.5V			500	
t_R,t_F	Rise, Fall time	0.8V~2.0V			1.35	ns
t_{PZL},t_{PZH}	Output enable time				5	
t_{PLZ},t_{PHZ}	Output disable time				10	
t_{DC}	Output duty cycle	$t_{DC} = t_H/t_{CY}$, t_H = High Pulse Width, t_{CY} = Output Cycle Time, @ 1.5V	45		55	%

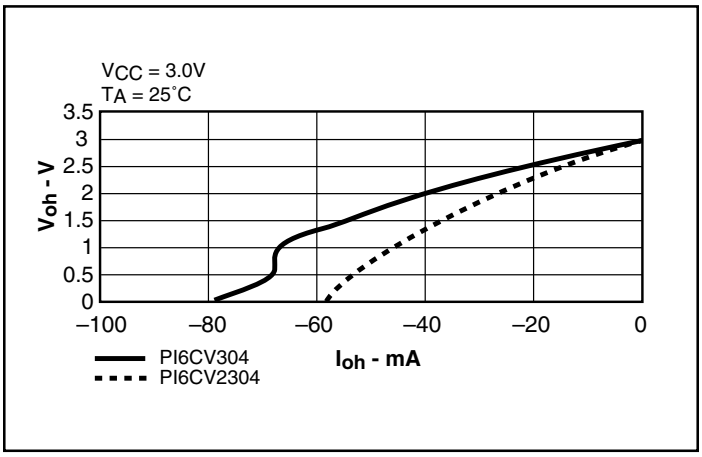
Note: 1. Identical traces, loads, power supply.

Rise/Fall Time

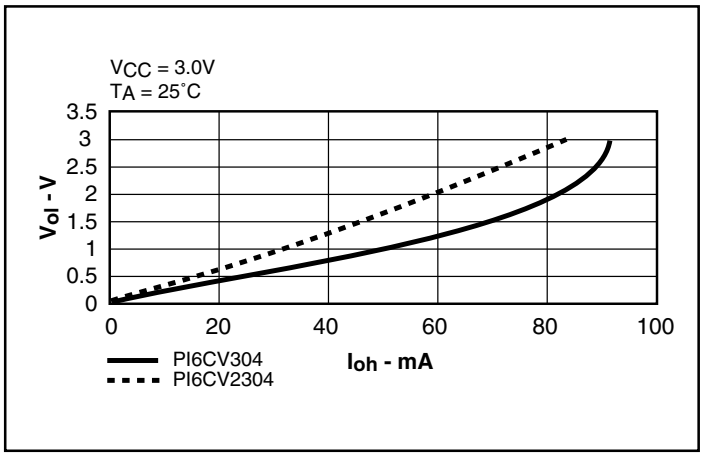


Note:
For test circuit: R_S = 0 for PI6CV2304, R_S = 15 ohms for PI6CV304
C_L = 10, 15, 22, or 33pF, depending on frequency.

High-Level Output Voltage vs. High-Level Output Current

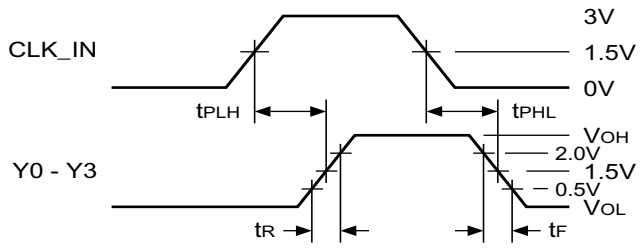


Low-Level Output Voltage vs. Low-Level Output Current

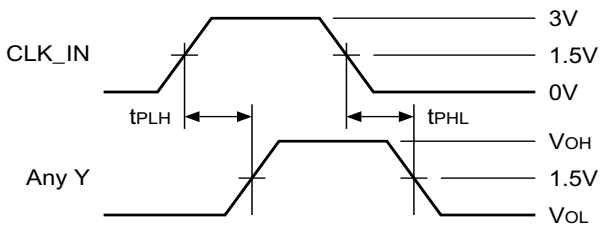


Switching Waveforms

Propagation Delay

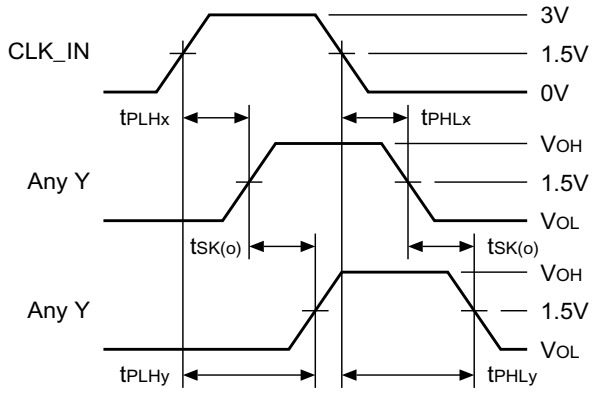


Pulse Skew – $t_{SK(p)}$



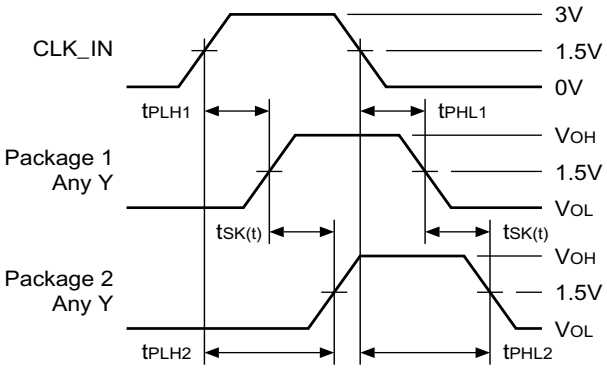
$t_{SK(p)} = |t_{PHL} - t_{PLH}|$

Output Skew – $t_{SK(o)}$



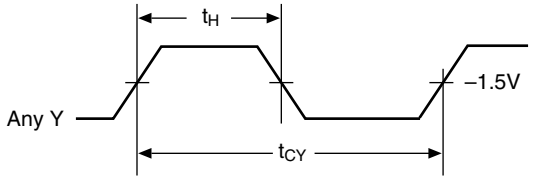
$t_{SK(o)} = |t_{PLHy} - t_{PLHx}|$ or $|t_{PHLy} - t_{PHLx}|$

Package Skew – $t_{SK(t)}$

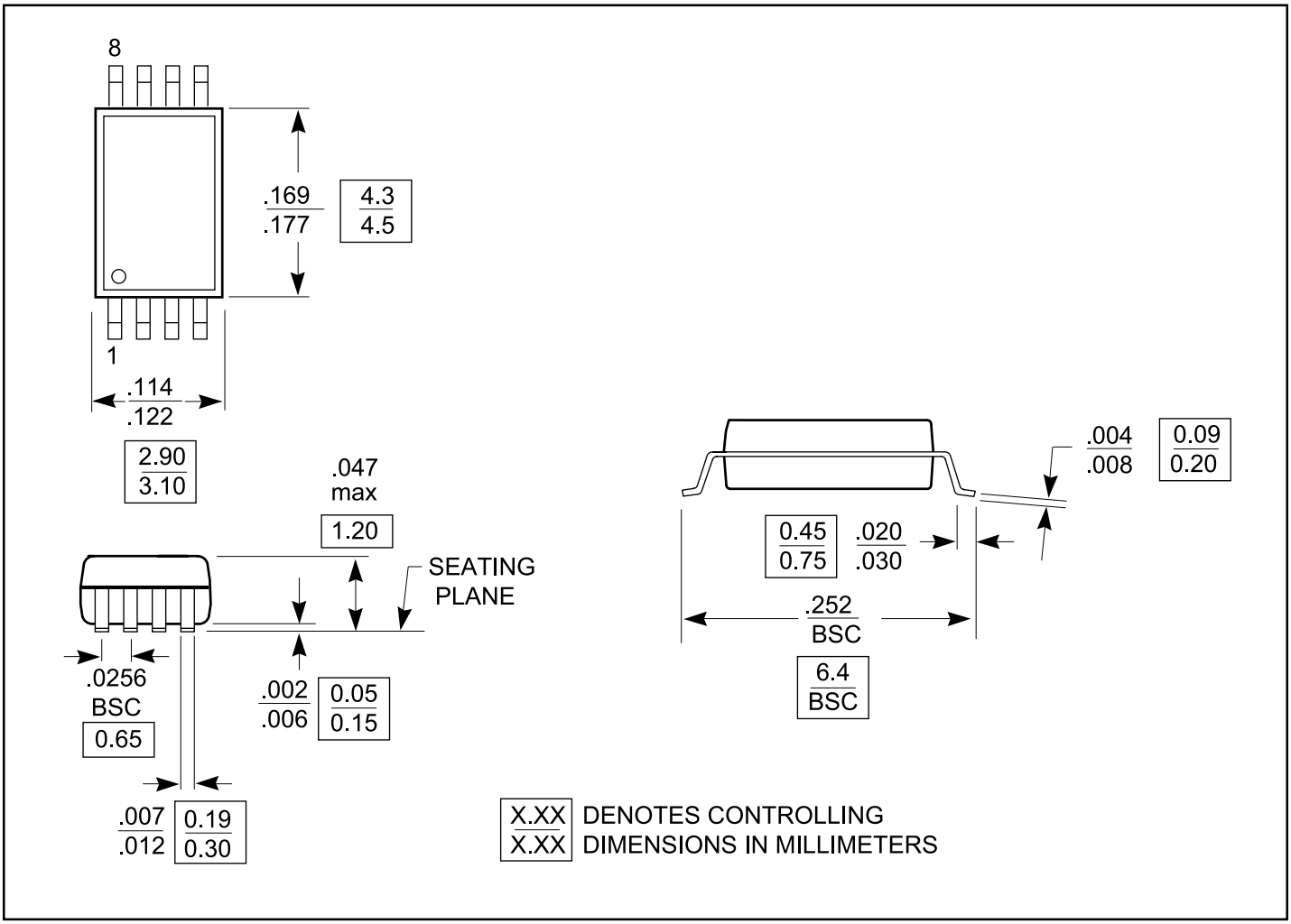


$t_{SK(t)} = |t_{PLH2} - t_{PLH1}|$ or $|t_{PHL2} - t_{PHL1}|$

Output Duty Cycle – t_{DC}



8-Pin TSSOP (L) Package Diagram



Ordering Information

Part Number	Package Type
PI6CV304L	TSSOP, 0.65 mm pitch, 4.4 x 3.0 x 1.2 mm body
PI6CV2304L	TSSOP, 0.65 mm pitch, 4.4 x 3.0 x 1.2 mm body