PI6C2310

PCI-X Clock Buffers

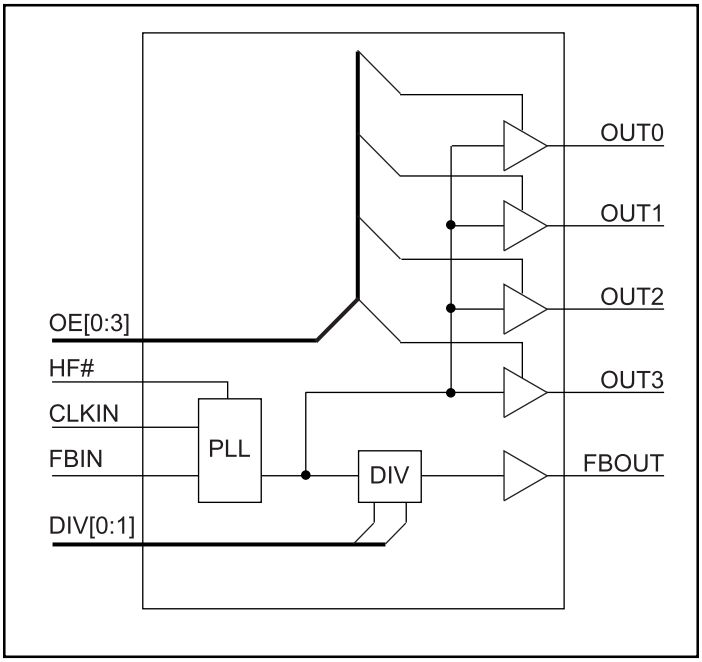
Product Features

- Four synchronous outputs
- Selectable divider/multiplier
- Output Enable control
- Low phase error < 150 ps
- Allows clock input to have spread spectrum modulation for EMI reduction
- Low output skew < 200 ps
- Low cycle jitter < 200 ps
- Industrial temperature (–40° C to 85° C)
- 3.3V V supply
- Packages: 24-pin QSOP (Q) and 24-pin TSSOP (L)

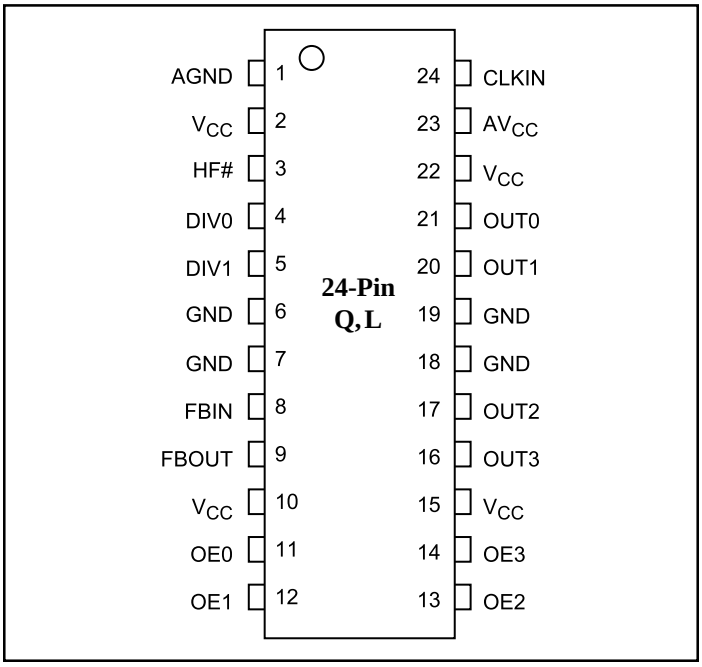
Product Description

PI6C2310 is a low skew, low jitter, PLL clock buffer with divider or multiplier designed for PCI-X application in servers and workstations. There are two selectable input ranges using HF# input: 10-40 MHz and 40-80 MHz. All outputs are synchronized to the input and to the other outputs. Each output can be independently turned off to reduce EMI and power consumption.

Block Diagram



Pin Configuration



Clock Select Table

HF#	DIV1	DIV0	OUTx	CLKIN	OUTx
1	1	1	CLKIN	33MHz	33MHz
1	1	0	2xCLKIN		66MHz
1	0	1	3xCLKIN		100MHz
1	0	0	4xCLKIN		133MHz
0	1	1	CLKIN/2	66MHz	33MHz
0	1	0	CLKIN		66MHz
0	0	1	1.5xCLKIN		100MHz
0	0	0	2xCLKIN		133MHz

Pin Description

Pin	Type	Qty	Symbol	Description
16,17,20,21	O	4	OUT[0:3]	Clock outputs. To achieve zero input to output delay, all outputs must have the same loading.
11-14	I	4	OE[0:3]	Active high Output Enable, pulled up. When OE is low, OUT [0:3] outputs are disabled at low state.
9	O	1	FBOUT	Feedback output. To achieve zero input to output delay, FBOUT must have the same loading as OUT[0:3].
8	I	1	FBIN	Feedback input. 7pF must be added to the output driving this pin (FBOUT) in addition to the other load.
24	I	1	CLKIN	Input Clock.
3	I	1	HF#	High Frequency range, pulled up. "1" = Low, "0" = High.
4,5	I	2	DIV[0,1]	Divider/Multiplier Select, pulled up.
2,10,15,22	P	4	V_{CC}	3.3V power
6,7,18,19	P	4	GND	Ground
23	P	1	AV_{CC}	3.3V analog power
1	P	1	AGND	Analog ground

Absolute Maximum Ratings

Supply Voltage (V_{CC}, AV_{CC}) ..... 0.5V to +7.0V
Input Voltage ..... –0.5V to Vcc+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 Condition

Symbol	Description	Min.	Max.	Units
V_{CC}, AV_{CC}	I/O Supply, Analog Core Supply	3.0	3.6	V
Ta	Industrial Ambient Temperature	–40	+85	°C

DC Electrical 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	uA
I_{ih}	High Input Current	V_{IN} = V_{CC}			200	
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			
Idd_33	Supply Current	C_l = 15pF, F_{OUT} = 33MHz		25	tbd	mA
Idd_66	Supply Current	C_l = 15pF, F_{OUT} = 66MHz		35		
Idd_100	Supply Current	C_l = 15pF, F_{OUT} = 100MHz		45		
Idd_133	Supply Current	C_l = 15pF, F_{OUT} = 133MHz		60		
C_o	Output Capacitance				6	pF
C_i	Input Capacitance				5	
C_l	Load Capacitance				15	
L_{pin}	Pin Inductance				7	nH

Switching Characteristics (T_A = 25°C, V_{CC} = 3.3V ±0.3V, C_l = 15pF, F_{OUT} = 66.67 MHz)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
F_{in}	Input frequency	Low Freq., HF# = "1"	10	33	40	MHz
		High Freq., HF# = "0"	40	66	80	
T_{pd}	Propagation delay	CLKIN to FBIN rising edges @V_{DD}/2	–150		150	ps
T_{sk}	Output skew	@1.4V, rising edges			200	
T_{skpp}	Pkg to pkg skew	@V_{DD}/2, rising edges, same CLKIN			400	
T_{jc}	Cycle jitter				200	
T_{dc}	Duty cycle	@1.4V	45	50	55	%
T_r/T_f	Rise/Fall time	0.8V~2.0V			1.5	ns

Note: $T_{jc} = T_p(n+1) - T_p(n)$ $T_{dc} = T_h/T_p$
$T_p(n)$ = Period of the n_{th} cycle T_p = Period cycle time
$T_p(n+1)$ = Period of $n_{th}+1$ cycle T_h = High time @1.4V

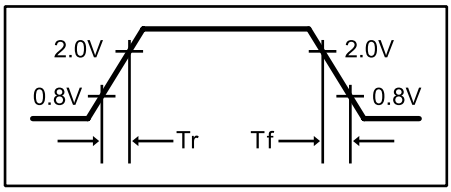


Figure 1. Rise/Fall time

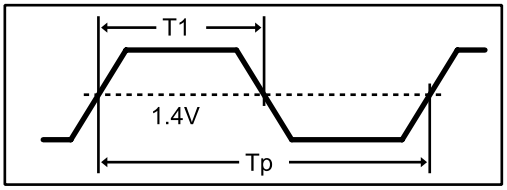


Figure 2. Duty cycle

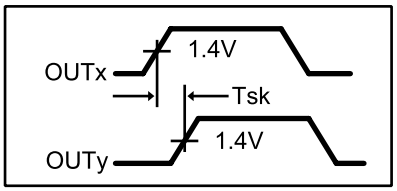


Figure 3. Output skew

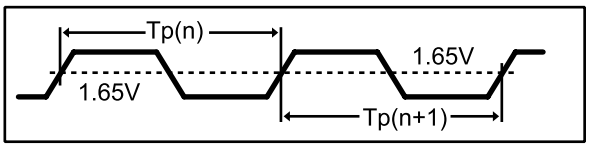


Figure 4. Cycle jitter

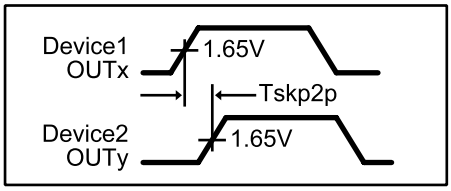


Figure 5. Pkg.-to-Pkg. skew

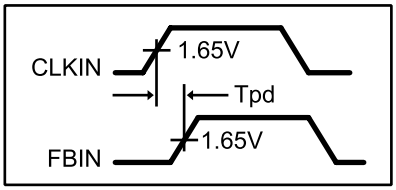


Figure 6. Propagation Delay

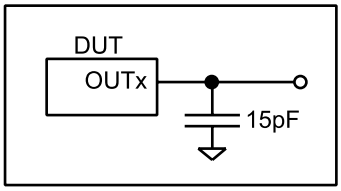
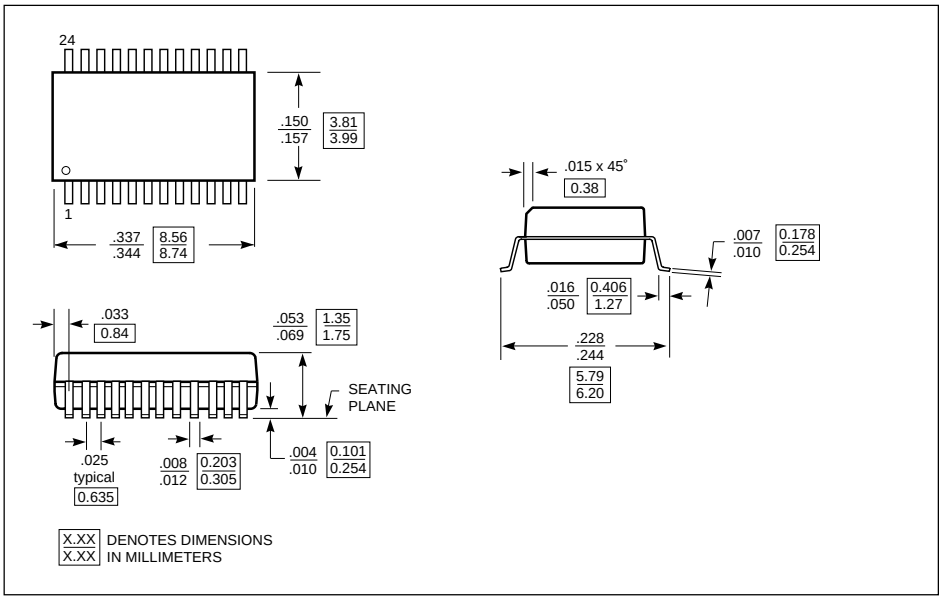
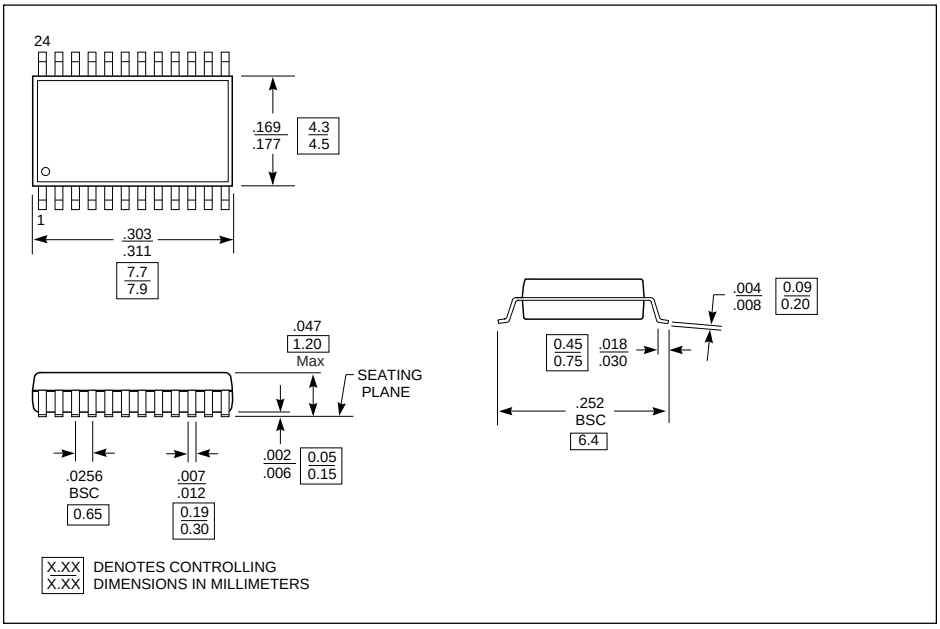


Figure 7. Test load

Packaging Mechanical: 24-pin QSOP (Q)



Packaging Mechanical: 24-Pin TSSOP (L)



Ordering Information

Ordering Code	Package Name	Package Type	Operating Temp
PI6C2310Q	Q24	24-pin, 150-mil QSOP	Industrial
PI6C2310L	L24	24-pin, 4.4-mil TSSOP	

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