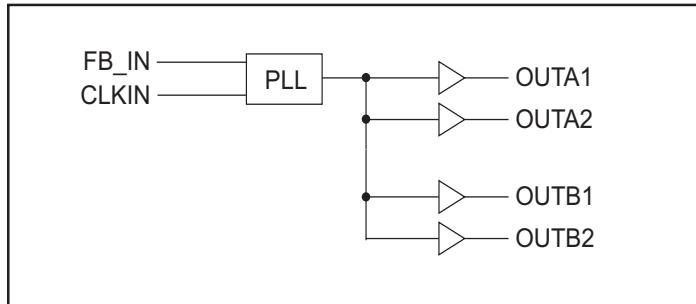


## Features

- Maximum rated frequency: 133 MHz
- Low cycle-to-cycle jitter
- Input to output delay, less than 200ps
- External feedback pin allows outputs to be synchronized to the clock input
- 5V tolerant input\*
- Operates at 3.3V V<sub>DD</sub>
- Test mode allows bypass of the PLL for system testing purposes (e.g., IBIS measurements)
- Space-saving Packaging (Pb-free and Green Available):
  - 8-pin, 150-mil SOIC (W)

\* *FB\_IN* and *CLKIN* must reference the same voltage thresholds for the PLL to deliver zero delay skewing

## Block Diagram



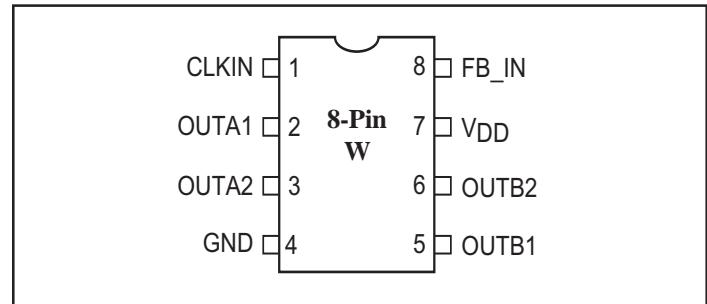
## Description

The PI6C2404A-1 is a PLL-based, zero-delay buffer, with the ability to distribute four outputs of up to 133 MHz at 3.3V. Two banks of two outputs exist, OUTA[1-2] and OUTB[1-2].

An external feedback pin is used to synchronize the outputs to the input; the relationship between loading of this signal and the other outputs determines the input-output delay.

The PI6C2404A-1 is characterized for both commercial and industrial operation.

## Pin Configuration

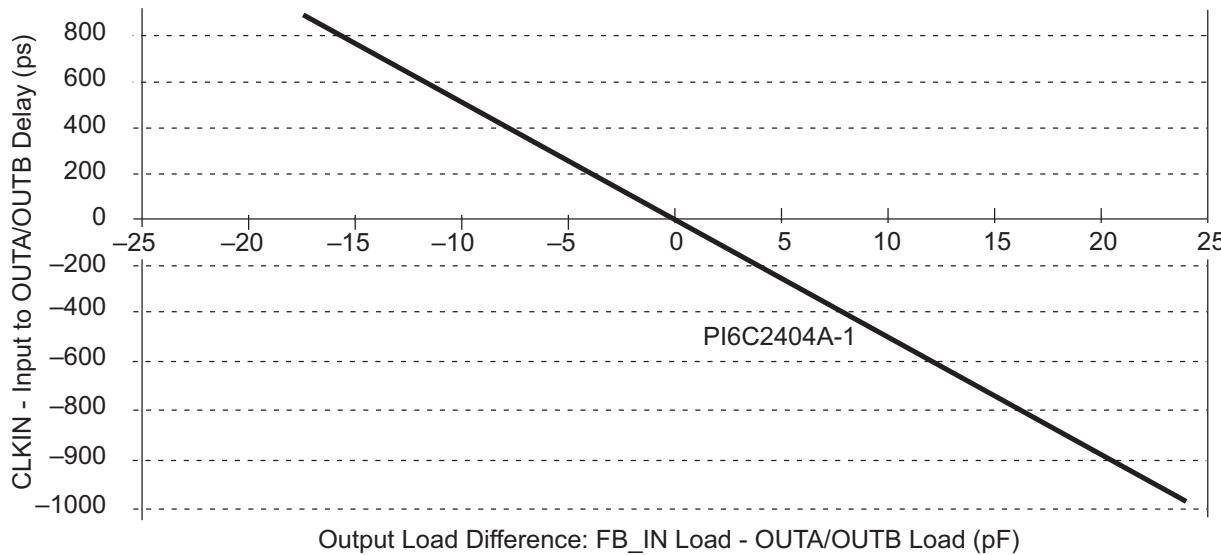


## Pin Description

Pin	Signal	Description
1	CLKIN	Input clock reference frequency (weak pull-down)
2, 3	OUTA[1-2]	Clock output, Bank A
7	V <sub>DD</sub>	3.3V supply
4	GND	Ground
5, 6	OUTB[1-2]	Clock output, Bank B
8	FB_IN	PLL feedback input

## Zero-Delay and Skew Control

CLKIN Input to Output Bank Delay vs. Difference in Loading between FB\_IN pin and OUTA/OUTB pins



The relationship between loading of the FB\_IN signal and other outputs determines the input-output delay. Zero delay is achieved when all outputs, including feedback, are loaded equally.

## Maximum Ratings

Supply Voltage to Ground Potential .....	-0.5V to +7.0V
DC Input Voltage (Except CLKIN) .....	-0.5V to V <sub>DD</sub> +0.5V
DC Input Voltage CLKIN .....	-0.5 to 7V
Storage Temperature .....	-65°C to +150°C
Maximum Soldering Temperature (10 seconds) .....	260°C
Junction Temperature .....	150°C
Static Discharge Voltage (per MIL-STD-883, Method 3015) .....	>2000V

## Operating Conditions (V<sub>CC</sub>=3.3V±0.3V)

Parameter	Description	Min.	Max.	Units
V <sub>DD</sub>	Supply Voltage	3.0	3.6	V
T <sub>A</sub>	Commercial Operating Temperature	0	70	°C
	Industrial Operating Temperature	-40	85	
C <sub>L</sub>	Load Capacitance, below 100 MHz	—	30	pF
	Load Capacitance, from 100 MHz to 133 MHz	—	15	
C <sub>IN</sub>	Input Capacitance	—	7.3	

### DC Electrical Characteristics for Industrial Temperature Devices

Parameter	Description	Test Conditions	Min.	Max.	Units
V <sub>IL</sub>	Input LOW Voltage		0.8	2.0	V
V <sub>IH</sub>	Input HIGH Voltage				
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0V		50	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>DD</sub>			
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 8mA		0.4	V
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -8mA			
I <sub>DD</sub>	Supply Current	Unloaded outputs 100 MHz, Select inputs at V <sub>DD</sub> or GND		54	mA
		Unloaded outputs 66 MHz, CLKIN			
		Unloaded outputs 33MHz, CLKIN			

### AC Electrical Characteristics for Industrial Temperature Devices

Parameters	Name	Test Conditions	Min.	Typ.	Max.	Units
F <sub>O</sub>	Output Frequency	30pF load	10		100	MHz
		15pF load			133	
t <sub>DC</sub>	Duty Cycle <sup>(1)</sup>	Measured at V <sub>DD</sub> /2, F <sub>OUT</sub> <66.67MHz 30pF load	40	50	60	%
		Measured at V <sub>DD</sub> /2, F <sub>OUT</sub> <50MHz 15pF load	45		55	
t <sub>R</sub>	Rise Time <sup>(1)</sup>	Measured between 0.8V and 2.0V, 30pF load			2.2	ns
		Measured between 0.8V and 2.0V, 15pF load			1.5	
t <sub>F</sub>	Fall Time <sup>(1)</sup>	Measured between 0.8V and 2.0V, 30pF load			2.2	ns
		Measured between 0.8V and 2.0V, 15pF load			1.5	
t <sub>SK(O)</sub>	Output to Output Skew within same bank <sup>(1)</sup>	All outputs equally loaded			200	ps
	OUTA to OUTB Skew <sup>(1)</sup>					
t <sub>0</sub>	Delay, CLKIN Rising Edge to FB_IN Rising Edge <sup>(1)</sup>	Measured at V <sub>DD</sub> /2			275	ps
t <sub>SK(D)</sub>	Device-to-Device Skew <sup>(1)</sup>	Measured at V <sub>DD</sub> /2 on FB_IN pins of devices			0	
t <sub>JIT</sub>	Cycle-to-Cycle Jitter <sup>(1)</sup>	Measured at 66.67 MHz, loaded 30pF load			200	ps
		Measured at 133 MHz, loaded 15pF load			150	
t <sub>LOCK</sub>	PLL Lock Time <sup>(1)</sup>	Stable power supply, valid clocks presented on CLKIN and FB_IN pins			1.0	ms

#### Notes:

1. CLKIN and FB\_IN inputs have a threshold voltage of V<sub>DD</sub>/2.

### DC Electrical Characteristics for Commercial Temperature Devices

Parameter	Description	Test Conditions	Min.	Max.	Units
V <sub>IL</sub>	Input LOW Voltage		—	0.8	V
V <sub>IH</sub>	Input HIGH Voltage		2.0	—	
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0V	—	50	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>DD</sub>	—	112	
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 8mA	—	0.4	V
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -8mA	2.4	—	
I <sub>DD</sub>	Supply Current	Unloaded outputs 100 MHz Select Inputs @ V <sub>DD</sub> or GND	—	54	
I <sub>DD</sub>	Supply Current	Unloaded outputs, 66.67 MHz, Select inputs at V <sub>DD</sub> or GND	—	39	mA

### AC Electrical Characteristics for Commercial Temperature Device

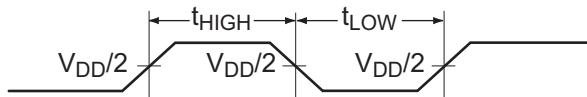
Parameters	Name	Test Conditions	Min.	Typ.	Max.	Units
F <sub>O</sub>	Output Frequency	30pF load	10		100	MHz
		15pF load,			133	
t <sub>DC</sub>	Duty Cycle <sup>(2)</sup>	Measured at V <sub>DD</sub> /2, F <sub>O</sub> < 66.67MHz, 30pF load	40	50	60	%
		Measured at V <sub>DD</sub> /2, F <sub>O</sub> < 50MHz, 15pF load	45	50	55	
t <sub>R</sub>	Rise Time <sup>(1)</sup> @ 30pF	Measured between 0.8V and 2.0V			2.2	ns
	Rise Time <sup>(1)</sup> @ 15pF				1.5	
t <sub>F</sub>	Fall Time <sup>(1)</sup> @ 30pF				2.2	
	Fall Time <sup>(1)</sup> @ 15pF				1.5	
t <sub>SK(O)</sub>	Output to Output Skew <sup>(1)</sup> within same bank	All outputs equally loaded, V <sub>DD</sub> /2			200	ps
	OUTA to OUTB Skew <sup>(1)</sup>	All outputs equally loaded, V <sub>DD</sub> /2			200	
t <sub>0</sub>	Input to Output Delay, CLKIN Rising Edge to FB_IN Rising Edge <sup>(1)</sup>	Measured at V <sub>DD</sub> /2			275	
t <sub>SK(D)</sub>	Device to Device Skew <sup>(1)</sup>	Measured at V <sub>DD</sub> /2 on FB_IN pins of devices			0	500
t <sub>JIT</sub>	Cycle-to-Cycle Jitter <sup>(1)</sup>	Measured at 66.67 MHz, loaded 30pF outputs			200	
		Measured at 133 MHz, loaded 15pF outputs			150	
t <sub>LOCK</sub>	PLL Lock Time <sup>(1)</sup>	Stable power supply, valid clocks presented on CLKIN and FB_IN pins			1.0	ms

#### Notes:

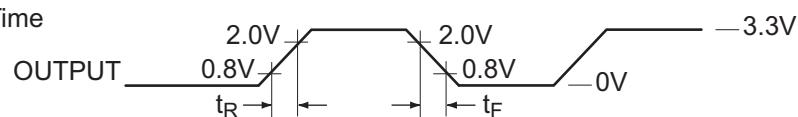
1. CLKIN and FB\_IN inputs have a threshold voltage of V<sub>DD</sub>/2.
2. t<sub>DC</sub> =  $\frac{t_{HIGH}}{t_{HIGH} + t_{LOW}}$

## Switching Waveforms

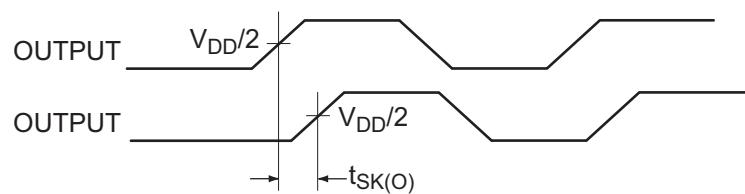
Duty Cycle Timing



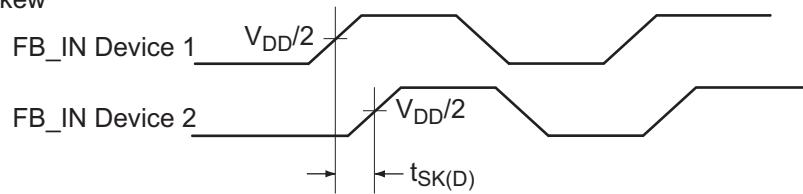
All Outputs Rise/Fall Time



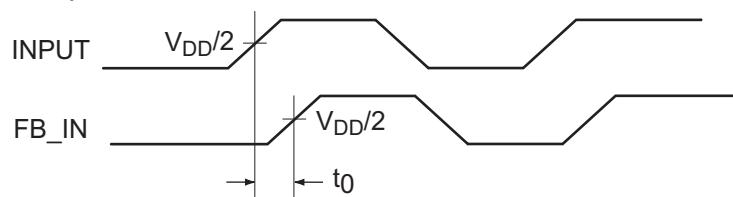
Output-Output Skew



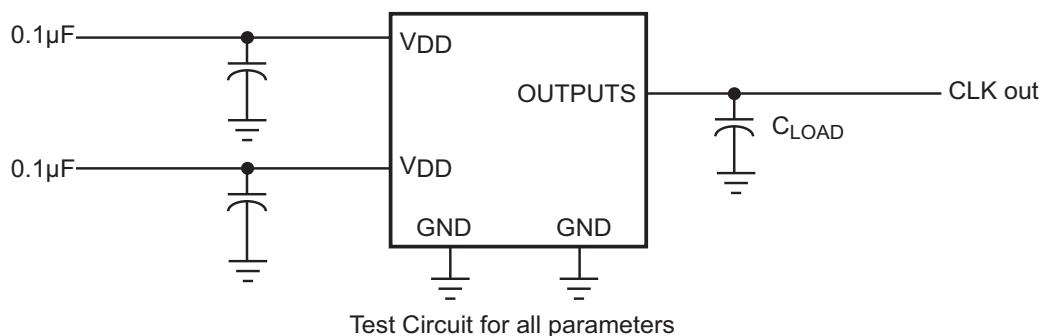
Device-Device Skew

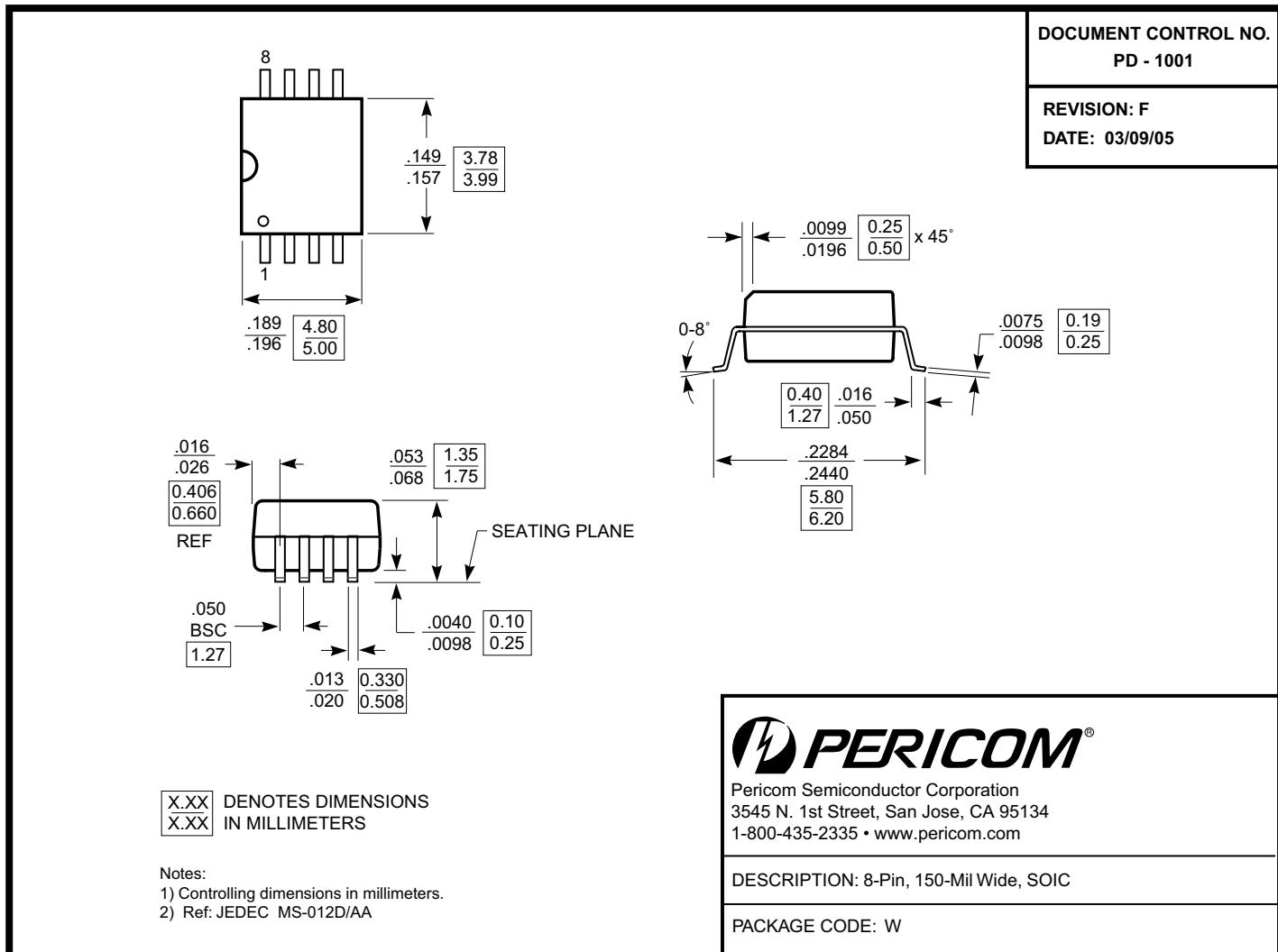


Input-Output Propagation Delay



## Test Circuit



**Packaging Mechanical: 8-Pin SOIC (W)**

**Ordering Information**

Ordering Code	Package Code	Package Description	Operating Range
PI6C2404A-1WE	W	Pb-free and Green 8-pin 150-mil SOIC	Commercial
PI6C2404A-1WIE	W	Pb-free and Green 8-pin 150-mil SOIC	Industrial

**Notes:**

1. Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)
2. X = Tape/Reel
3. E = Pb-free & Green