CYPRESS

CY2304NZ

Four Output PCI-X and General Purpose Buffer

Features

- **One input to four output buffer/driver**
- **General-purpose or PCI-X clock buffer**
- **Buffers all frequencies from DC to 140 MHz**
- **Output-to-output skew less than 100 ps**
- **Space-saving 8-pin TSSOP package**
- **3.3V operation**
- **60 ps typical output-output skew**

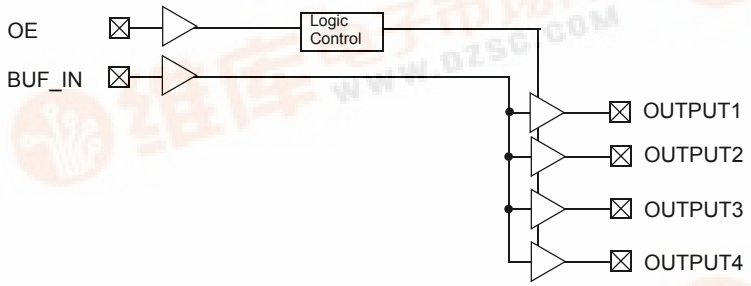
Functional Description

The CY2304NZ is a low-cost buffer designed to distribute high-speed clocks for PCI-X and other applications. The device operates at 3.3V and outputs can run up to 140 MHz.

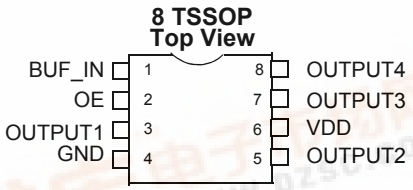
Table 1. Function Table

Inputs		Outputs
BUF_IN	OE	Output [1:4]
L	L	L
H	L	L
L	H	L
H	H	H

Block Diagram



Pin Configuration



Pin Description for CY2304NZ

Signal	Pin	Description
V_{DD}	6	3.3V voltage supply
GND	4	Ground
BUF_IN	1	Input clock
OUTPUT [1:4]	3, 5, 7, 8	Outputs
OE	2	Input pin for output enable, active HIGH.

Maximum Ratings

Supply Voltage to Ground Potential .....–0.5V to V_{DD} +0.5V
DC Input Voltage (Except REF) .....–0.5V to V_{DD} +0.5V
DC Input Voltage REF.....–0.5V to V_{DD} +0.5V

Storage Temperature ..... –65°C to +150°C
Max. Soldering Temperature (10 sec.) ..... 260°C
Junction Temperature..... 150°C
Static Discharge Voltage
(per MIL-STD-883, Method 3015) .....> 2,000V

Operating Conditions

Parameter	Description	Min.	Max.	Unit
V_{DD}	Supply Voltage	3.0	3.6	V
T_A	Operating Temperature (Ambient Temperature)	–40	85	°C
C_L	Load Capacitance	–	25	pF
C_{IN}	Input Capacitance	–	7	pF
BUF_IN, OUTPUT [1:4]	Operating Frequency	DC	140	MHz
t_{PU}	Power-up time for all VDD's to reach minimum specified voltage (power ramps must be monotonic)	0.05	50	ms

Electrical Characteristics

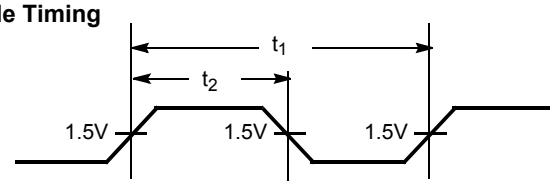
Parameter	Description	Test Conditions	Min.	Max.	Unit
V_{IL}	Input LOW Voltage[1]		–	0.8	V
V_{IH}	Input HIGH Voltage[1]		2.0	–	V
I_{IL}	Input LOW Current	V_{IN} = 0V	–5	5	µA
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}	–5	5	µA
V_{OL}	Output LOW Voltage[2]	I_{OL} = 24 mA	–	0.8	V
		I_{OL} = 12 mA	–	0.55	V
V_{OH}	Output HIGH Voltage[2]	I_{OH} = –24 mA	2.0	–	V
		I_{OH} = –12 mA	2.4	–	V
I_{DD}	Supply Current	Unloaded outputs at 66.66 MHz	–	25	mA

Switching Characteristics[3] for Commercial and Industrial Temperature Devices

Parameter	Name	Description	Min.	Typ.	Max.	Unit
	Duty Cycle[2] = $t_2 \div t_1$	Measured at 1.5V	40.0	50.0	60.0	%
t_3	Rise Time[2]	Measured between 0.8V and 2.0V	–	–	1.50	ns
t_4	Fall Time[2]	Measured between 0.8V and 2.0V	–	–	1.50	ns
t_5	Output to Output Skew[2]	All outputs equally loaded	–	60	100	ps
t_6	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge[2]	Measured at V_{DD}/2	2.5	3.5	5	ns

Switching Waveforms

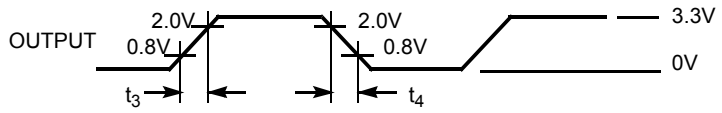
Duty Cycle Timing



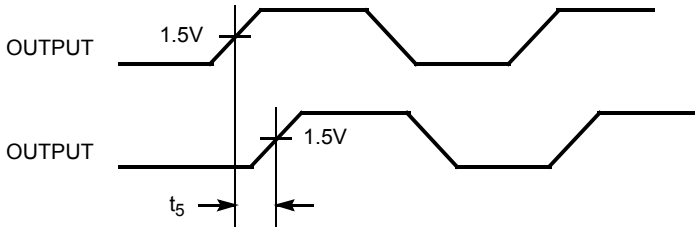
Notes:
1. BUF_IN input has a threshold voltage of V_{DD}/2.
2. Parameter is guaranteed by design and characterization. It is not 100% tested in production.
3. All parameters specified with loaded outputs.

Switching Waveforms (continued)

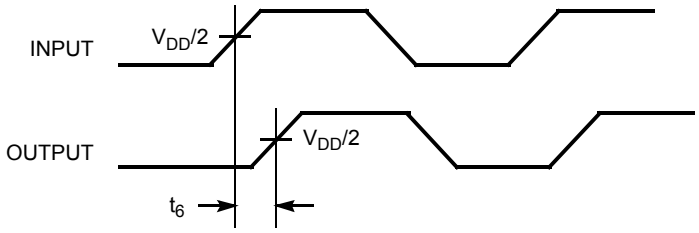
All Outputs Rise/Fall Time



Output-Output Skew



Input-Output Propagation Delay

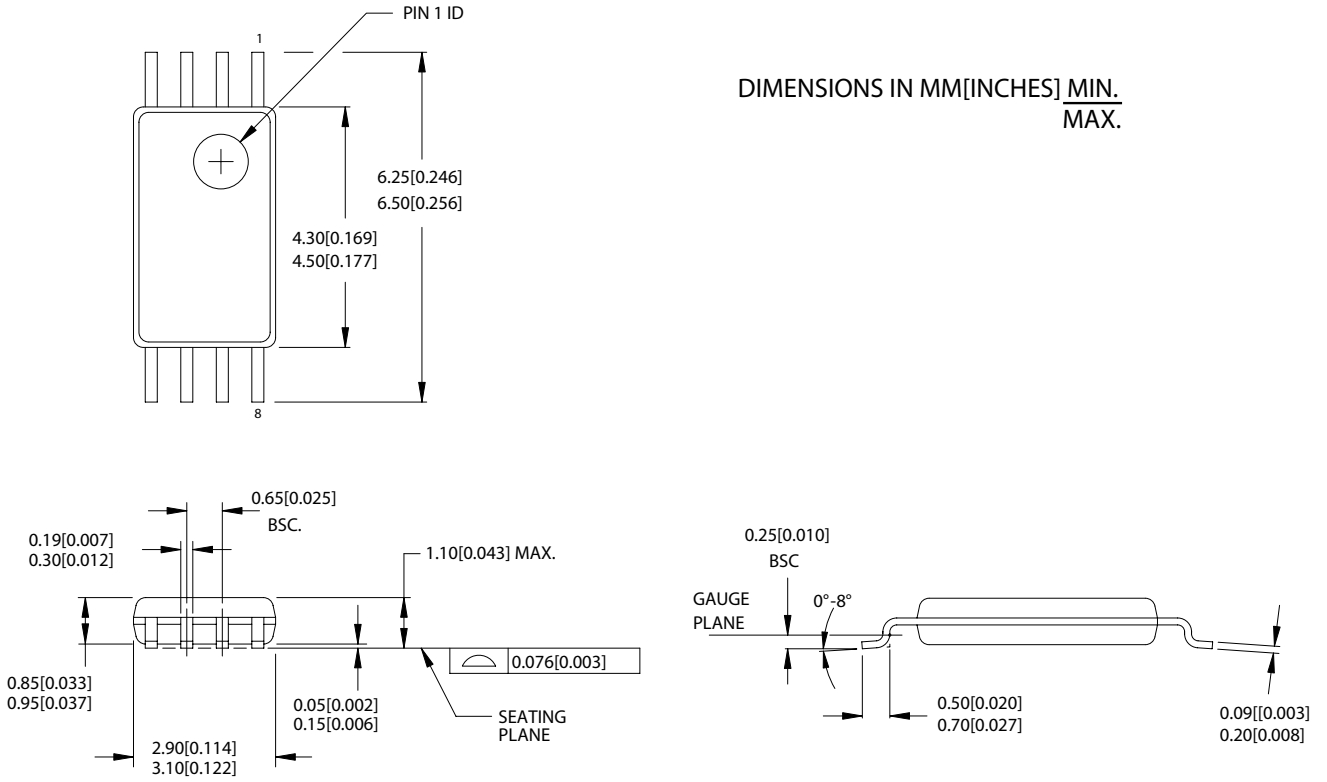


Ordering Information

Ordering Code	Package Type	Operating Range
Standard		
CY2304NZZC-1	8-pin TSSOP	Commercial, 0°C to 70°C
CY2304NZZC-1T	8-pin TSSOP – Tape and Reel	Commercial, 0°C to 70°C
CY2304NZZI-1	8-pin TSSOP	Industrial, –40°C to 85°C
CY2304NZZI-1T	8-pin TSSOP – Tape and Reel	Industrial, –40°C to 85°C
Lead-free		
CY2304NZZXC-1	8-pin TSSOP	Commercial, 0°C to 70°C
CY2304NZZXC-1T	8-pin TSSOP – Tape and Reel	Commercial, 0°C to 70°C
CY2304NZZXI-1	8-pin TSSOP	Industrial, –40°C to 85°C
CY2304NZZXI-1T	8-pin TSSOP – Tape and Reel	Industrial, –40°C to 85°C

Package Diagram

8-Lead Thin Shrunk Small Outline Package (4.40 MM Body) Z8



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Document History Page

Document Title: CY2304NZ Four Output PCI-X and General Purpose Buffer Document Number: 38-07099				
REV.	**ECN NO.**	**Issue Date**	**Orig. of Change**	**Description of Change**
**	111420	02/12/02	IKA	New data sheet
*A	118610	09/25/02	HWT	Added Industrial Temperature Range in the Ordering Information
*B	121820	12/14/02	RBI	Power-up requirements added to Operating Conditions Information
*C	291098	See ECN	RGL	Added Lead-free Devices Specified typical value for output-output skew