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
- 3.3 V operation
- 60 ps typical output-output skew

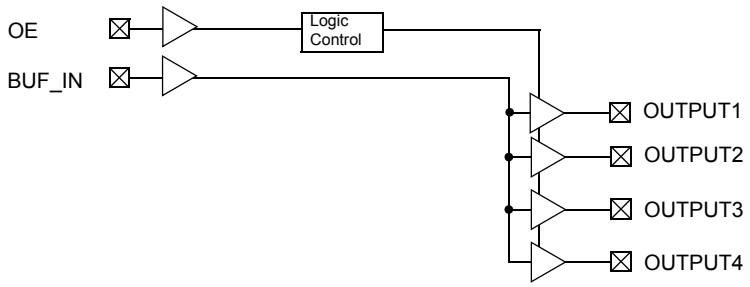
Functional Description

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

Table 1. Function Table

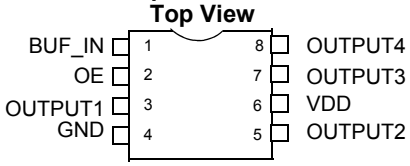
Inputs		Outputs
BUF_IN	OE	Output [1:4]
L	L	L
H	L	L
L	H	L
H	H	H

Block Diagram



Pin Configuration

8-pin TSSOP
Top View



Pin Description for CY2304NZ

Signal	Pin	Description
V_{DD}	6	3.3 V 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..... –0.5 V to V_{DD} + 0.5 V
DC Input Voltage ..... –0.5 V to V_{DD} + 0.5 V
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) ..... > 2,000 V

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} = 0 V	–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]

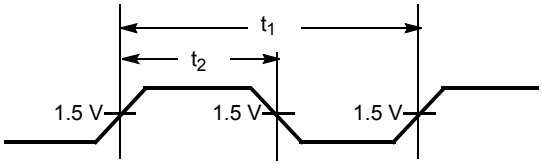
for Commercial and Industrial Temperature Devices

Parameter	Name	Description	Min	Typ	Max	Unit
	Duty Cycle[2] = $t_2 \div t_1$	Measured at 1.5 V	40.0	50.0	60.0	%
t_3	Rise Time[2]	Measured between 0.8 V and 2.0 V	–	–	1.50	ns
t_4	Fall Time[2]	Measured between 0.8 V and 2.0 V	–	–	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

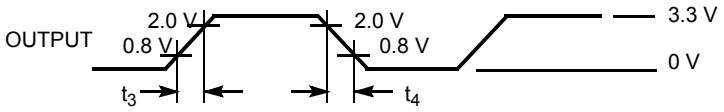
Notes
1. BUF_IN input has a threshold voltage of V_{DD}/2.
2. Parameter is guaranteed by design and characterization. It is not 100% tested in production.
3. All parameters specified with loaded outputs.

Switching Waveforms

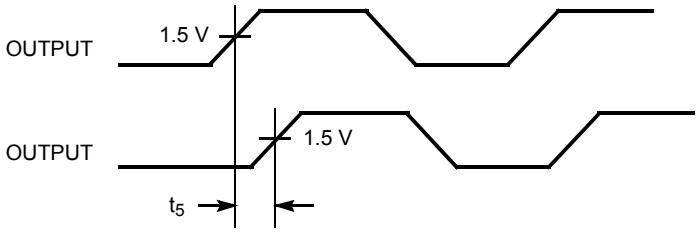
Duty Cycle Timing



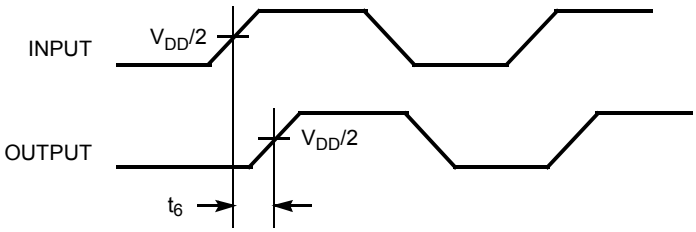
All Outputs Rise/Fall Time



Output-Output Skew



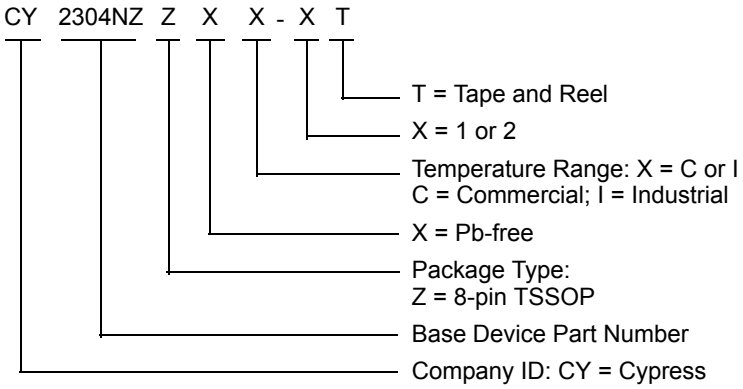
Input-Output Propagation Delay



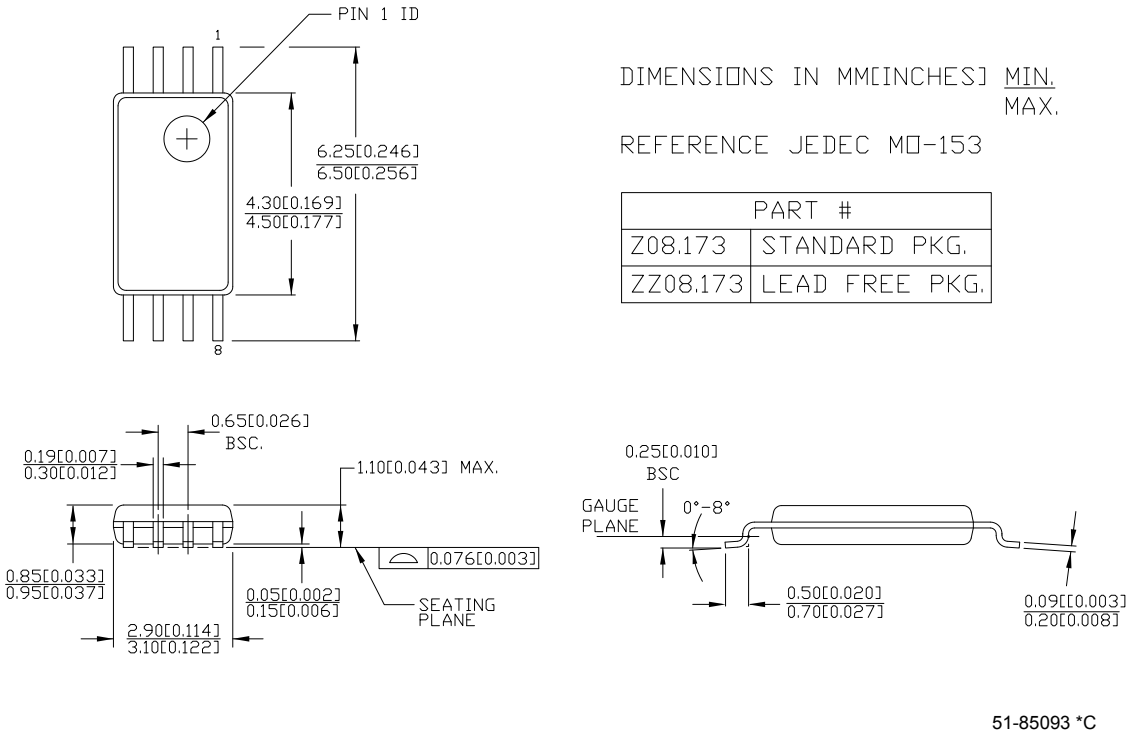
Ordering Information

Ordering Code	Package Type	Operating Range
Standard		
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
Pb-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

Ordering Code Definitions



Package Diagram



Acronyms

Acronym	Description
PCI	Peripheral Component Interconnect
TSSOP	thin-shrink small outline package

Document Conventions

Units of Measure

Symbol	Unit of Measure
°C	degree Celsius
Hz	Hertz
MHz	Mega Hertz
µA	micro Amperes
mA	milli Amperes
ms	milli seconds
ns	nano seconds
Ω	ohms
%	percent
pF	pico Farads
ps	pico seconds
mV	milli Volts
V	Volts
W	Watts

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
*D	2904623	04/05/10	CXQ	Removed inactive parts from Ordering Information. Updated Package Diagram.
*E	3163624	02/05/2011	CXQ	Updated Maximum Ratings (Removed reference to “Except REF” and “REF” for DC Input Voltage spec). Added Ordering Code Definitions. Updated Package Diagram. Added Acronyms and Units of Measure. Updated in new template.

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