



## 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 140MHz
- Output-to-output skew less than 100pS
- Available in 8-pin TSSOP and SOIC Packages
- 3.3V operation

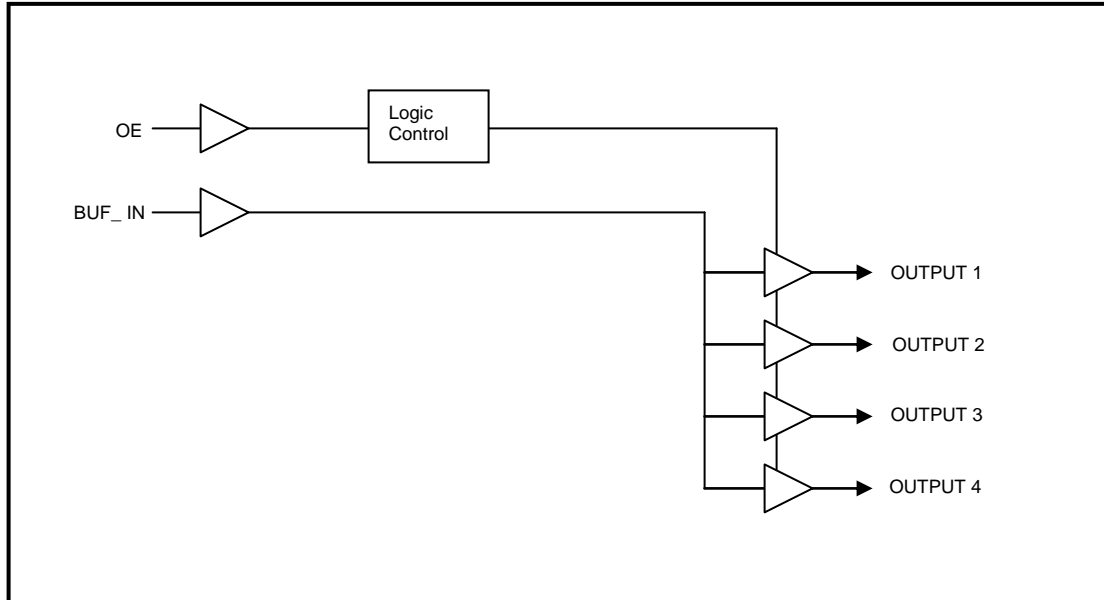
### Functional Description

The ASM2P2304NZ 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 140MHz.

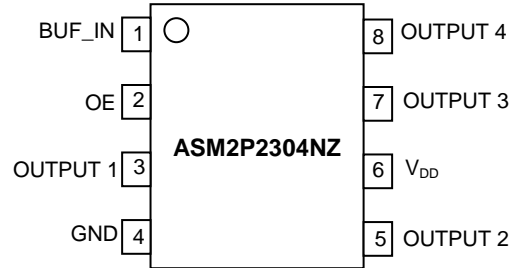
**Table 1. Function Table.**

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

Pin #	Pin Name	Type	Description
1	BUF_IN <sup>1</sup>	I	Input clock. 5V Tolerant Input.
2	OE	I	Input pin for Output Enable, active HIGH. Connect to V <sub>DD</sub> .
3	Output 1 <sup>2</sup>	O	Output 1.
4	GND	P	Ground.
5	Output 2 <sup>2</sup>	O	Output 2.
6	V <sub>DD</sub>	P	3.3V Voltage Supply.
7	Output 3 <sup>2</sup>	O	Output 3.
8	Output 4 <sup>2</sup>	O	Output 4.

Notes: 1. Weak pull down on input.  
2. Weak pull down on all outputs.

## Absolute Maximum Ratings

Parameter	Description	Min	Max
Supply Voltage to Ground Potential	-0.5	7	V
DC Input Voltage (Except BUF_IN)	-0.5	$V_{DD} + 0.5$	V
DC Input Voltage (BUF_IN)	-0.5	7	V
Storage Temperature	-65	+150	°C
Max. Soldering Temperature (10 sec)		260	°C
Junction Temperature		150	°C
Static Discharge Voltage (As per JEDEC STD22- A114-B)		2000	V

Note: These are stress ratings only and functional usage is not implied. Exposure to absolute maximum ratings for prolonged periods can affect device reliability.

## 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 $V_{DD}$ '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 <sub>IL</sub>	Input LOW Voltage <sup>1</sup>			0.8	V
V <sub>IH</sub>	Input HIGH Voltage <sup>1</sup>		2.0		V
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0V	-5	5	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>DD</sub>	-5	12	μA
V <sub>OL</sub>	Output LOW Voltage <sup>2</sup>	I <sub>OL</sub> = 24mA		0.8	V
		I <sub>OL</sub> = 12mA		0.55	V
V <sub>OH</sub>	Output HIGH Voltage <sup>2</sup>	I <sub>OH</sub> = -24mA	2.0		V
		I <sub>OH</sub> = -12mA	2.4		V
I <sub>DD</sub>	Supply Current	Unloaded outputs at 66.66MHz		25	mA

Notes: 1. BUF\_IN input has a threshold voltage of V<sub>DD</sub>/2.  
 2. Parameter is guaranteed by design and characterization. It is not 100% tested in production.

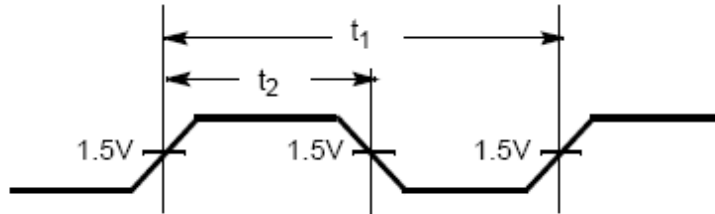
## Switching Characteristics for Commercial and Industrial Temperature Devices<sup>3</sup>

Parameter	Name	Description	Min	Typ	Max	Unit
t <sub>D</sub>	Duty Cycle <sup>2</sup> = t <sub>2</sub> ÷ t <sub>1</sub>	Measured at 1.5V	40.0	50.0	60.0	%
t <sub>3</sub>	Rise Time <sup>2</sup>	Measured between 0.8V and 2.0V			1.50	nS
t <sub>4</sub>	Fall Time <sup>2</sup>	Measured between 2.0V and 0.8V			1.50	nS
t <sub>5</sub>	Output to Output Skew <sup>2</sup>	All outputs equally loaded	For Commercial parts		100	pS
			For Industrial parts		150	
t <sub>6</sub>	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge <sup>2</sup>	Measured at V <sub>DD</sub> /2	2.5	3.5	5	nS

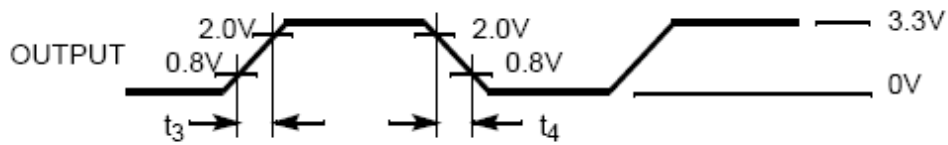
Notes: 1. BUF\_IN input has a threshold voltage of V<sub>DD</sub>/2.  
 2. Parameter is guaranteed by design and characterization. It is not 100% tested in production.  
 3. All parameters specified with loaded outputs.

**Switching Waveforms**

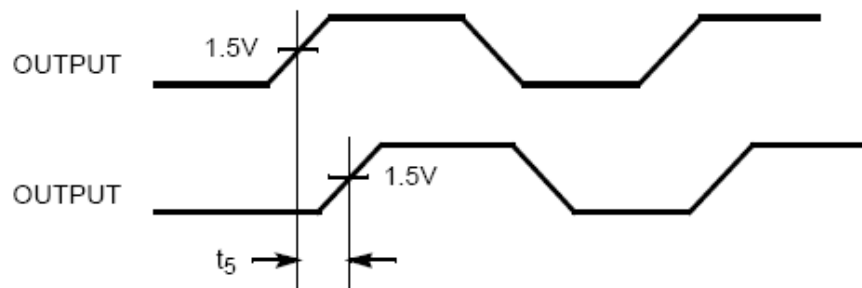
**Duty Cycle Timing**



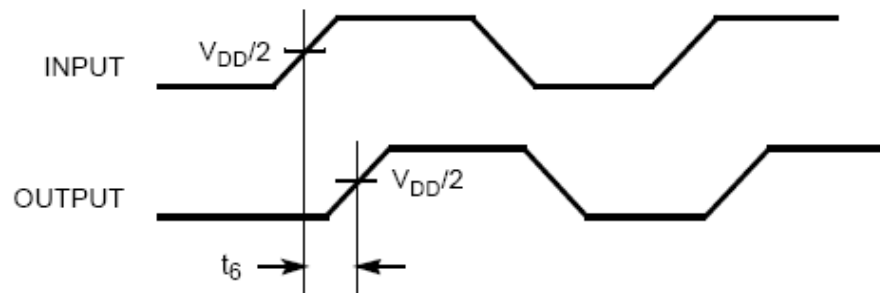
**All Outputs Rise/Fall Time**



**Output-Output Skew**

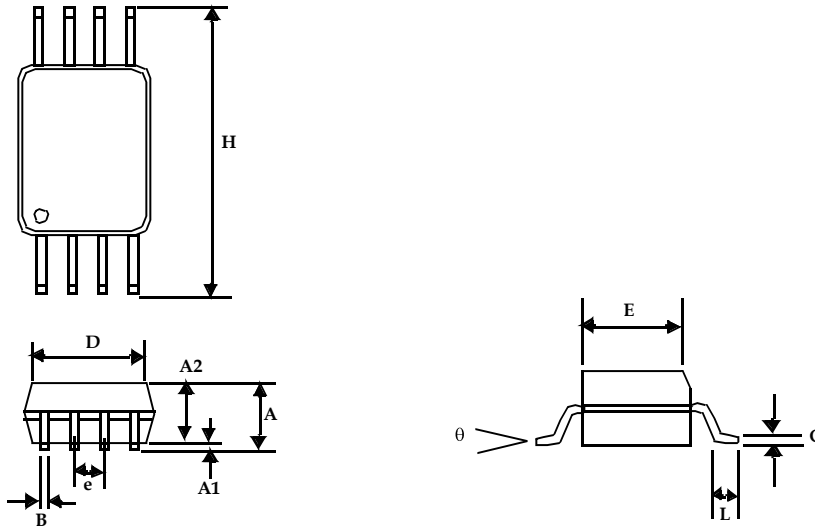


**Input-Output Propagation Delay**



Package Information

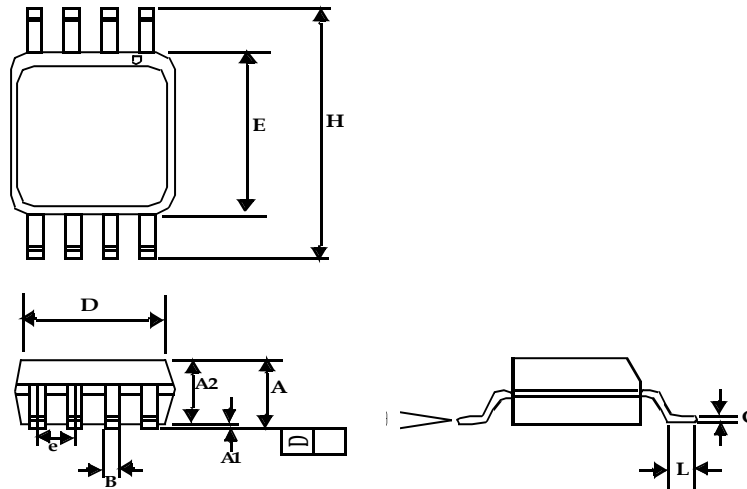
8-lead Thin Shrunken Small Outline Package (4.40-MM Body)



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

Package Information

8-lead (150-mil) SOIC Package



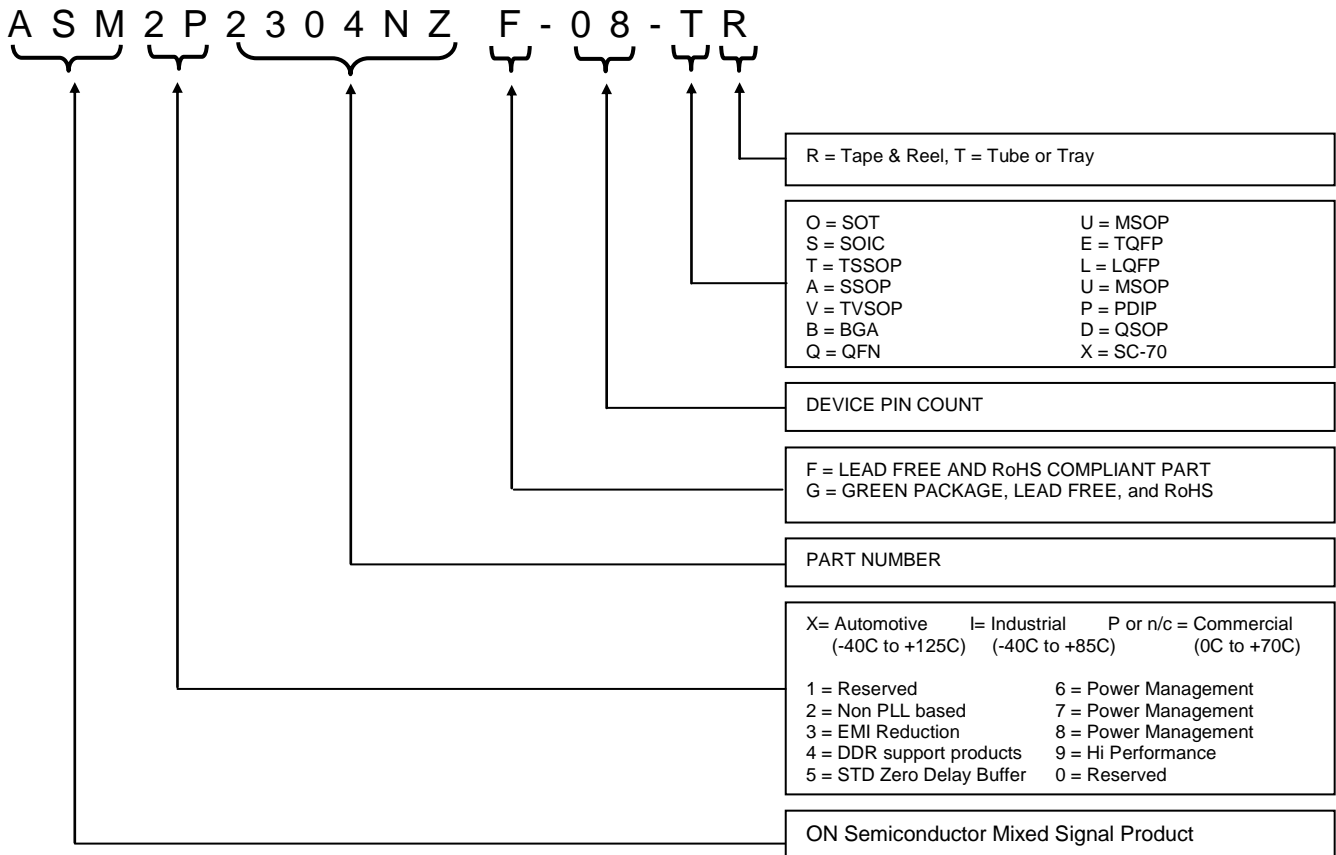
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

# ASM2P2304NZ

## Ordering Code

Part Number	Marking	Package Type	Temperature
P2P2304NZF-08ST	2P2304NZF	8-pin SOIC - Tube, Pb Free	Commercial
P2P2304NZF-08SR	2P2304NZF	8-pin SOIC - Tape and Reel, Pb Free	Commercial
ASM2I2304NZF-08-ST	2I2304NZF	8-pin SOIC - Tube, Pb Free	Industrial
ASM2I2304NZF-08-SR	2I2304NZF	8-pin SOIC - Tape and Reel, Pb Free	Industrial
ASM2P2304NZF-08-TT	2P2304NZF	8-pin TSSOP - Tube, Pb Free	Commercial
P2P2304NZF-08TR	2P2304NZF	8-pin TSSOP - Tape and Reel, Pb Free	Commercial
P2I2304NZF-08TT	2I2304NZF	8-pin TSSOP - Tube, Pb Free	Industrial
P2I2304NZF-08-TR	2I2304NZF	8-pin TSSOP - Tape and Reel, Pb Free	Industrial


## Device Ordering Information



Licensed under US patent #5,488,627, #6,646,463 and #5,631,920.



Note: This product utilizes US Patent #6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003.

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