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## ASM2P2304NZ

# 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

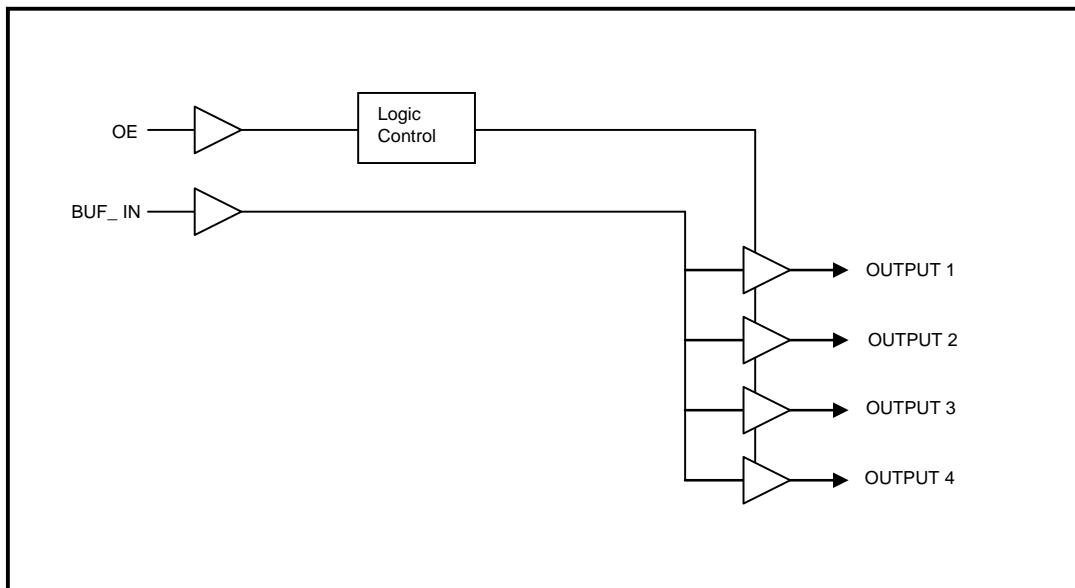
### Functional Description

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.**

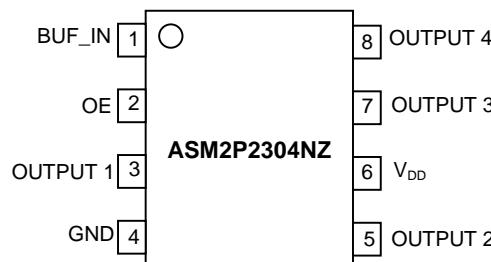
Inputs		Outputs
BUF_IN	OE	Output [1:4]
L	L	L
H	L	L
L	H	L
H	H	H

### Block Diagram



## ASM2P2304NZ

### 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.

**ASM2P2304NZ**
**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

## ASM2P2304NZ

### Electrical Characteristics

Parameter	Description	Test Conditions	Min	Max	Unit
$V_{IL}$	Input LOW Voltage <sup>1</sup>			0.8	V
$V_{IH}$	Input HIGH Voltage <sup>1</sup>		2.0		V
$I_{IL}$	Input LOW Current	$V_{IN} = 0V$	-5	5	$\mu A$
$I_{IH}$	Input HIGH Current	$V_{IN} = V_{DD}$	-5	12	$\mu A$
$V_{OL}$	Output LOW Voltage <sup>2</sup>	$I_{OL} = 24mA$		0.8	V
		$I_{OL} = 12mA$		0.55	V
$V_{OH}$	Output HIGH Voltage <sup>2</sup>	$I_{OH} = -24mA$	2.0		V
		$I_{OH} = -12mA$	2.4		V
$I_{DD}$	Supply Current	Unloaded outputs at 66.66MHz		25	mA

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.

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

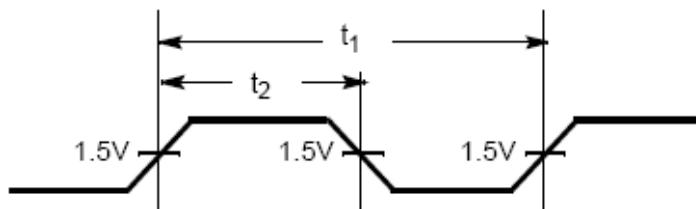
Parameter	Name	Description		Min	Typ	Max	Unit
$t_D$	Duty Cycle <sup>2</sup> = $t_2 \div t_1$	Measured at 1.5V		40.0	50.0	60.0	%
$t_3$	Rise Time <sup>2</sup>	Measured between 0.8V and 2.0V				1.50	nS
$t_4$	Fall Time <sup>2</sup>	Measured between 2.0V and 0.8V				1.50	nS
$t_5$	Output to Output Skew <sup>2</sup>	All outputs equally loaded	For Commercial parts			100	pS
			For Industrial parts			150	
$t_6$	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge <sup>2</sup>	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.

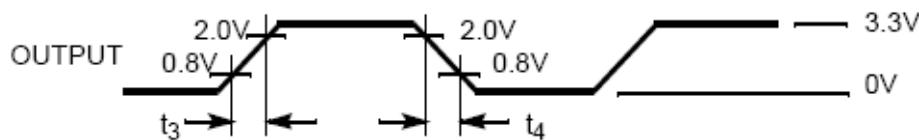
**ASM2P2304NZ**

**Switching Waveforms**

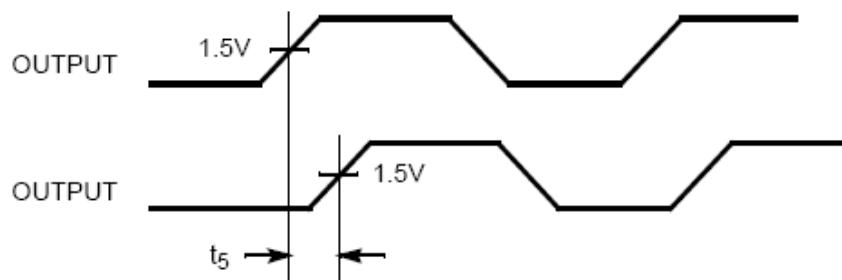
**Duty Cycle Timing**



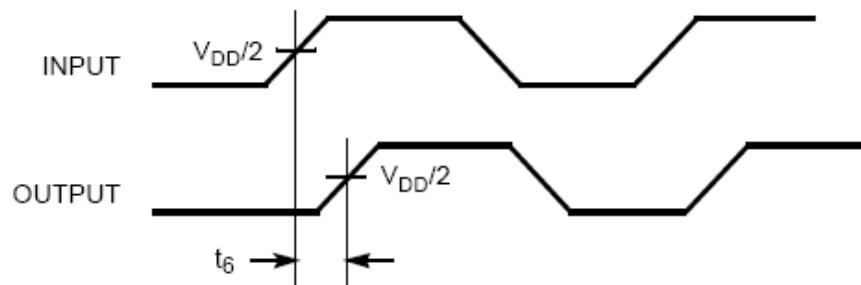
**All Outputs Rise/Fall Time**



**Output-Output Skew**



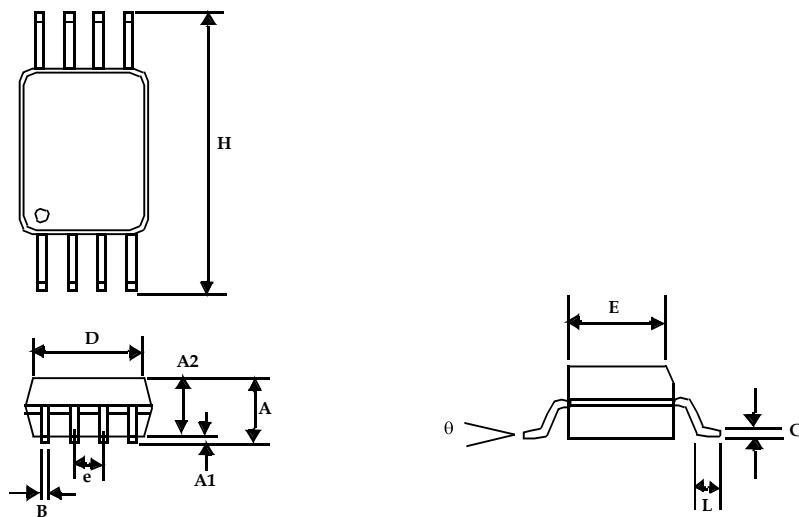
**Input-Output Propagation Delay**



**ASM2P2304NZ**

**Package Information**

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

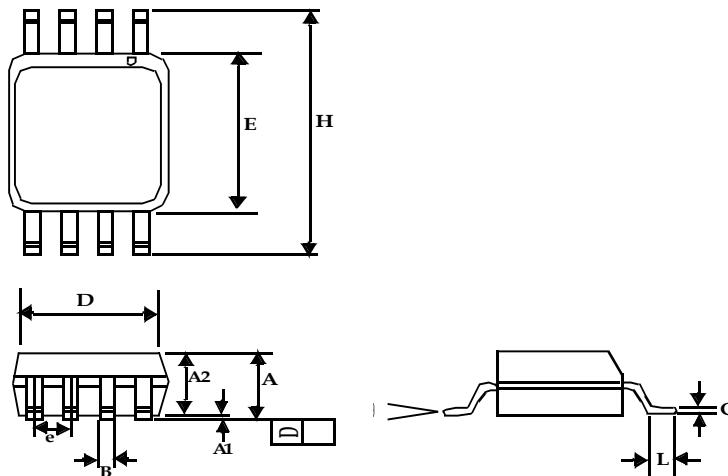


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°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

**ASM2P2304NZ**

**Package Information**

**8-lead (150-mil) SOIC Package**



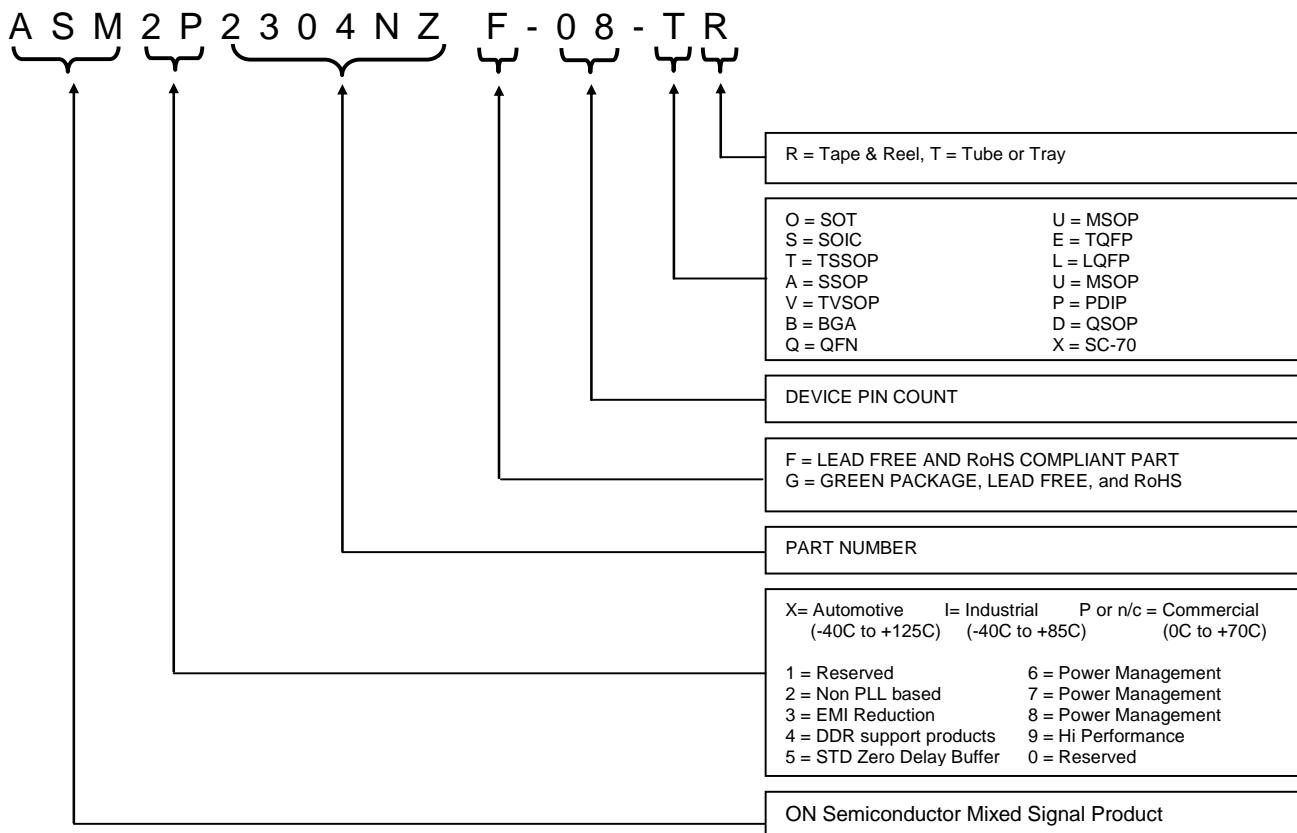
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°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



**ASM2P2304NZ**

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

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