

# PCS2I2309NZ

## 3.3 V 1:9 Clock Buffer

### Functional Description

PCS2I2309NZ is a low-cost high-speed buffer designed to accept one clock input and distribute up to nine clocks in mobile PC systems and desktop PC systems. The device operates at 3.3 V and outputs can run up to 133.33 MHz.

PCS2I2309NZ is designed for low EMI and power optimization and consumes less than 32 mA at 66.6 MHz, making it ideal for the low-power requirements of mobile systems. It is available in a 16-pin SOIC Package.

### Features

- One-Input to Nine-Output Buffer/Driver
- Buffers all Frequencies from DC to 133.33 MHz
- Low Power Consumption for Mobile Applications  
Less than 32 mA at 66.6 MHz with Unloaded Outputs
- Input-Output Delay: 6 nS (max)
- Output-Output Skew Less than 250 pS
- 16-pin SOIC Package
- Supply Voltage: 3.3 V  $\pm$  0.3 V
- These Devices are Pb-Free and are RoHS Compliant

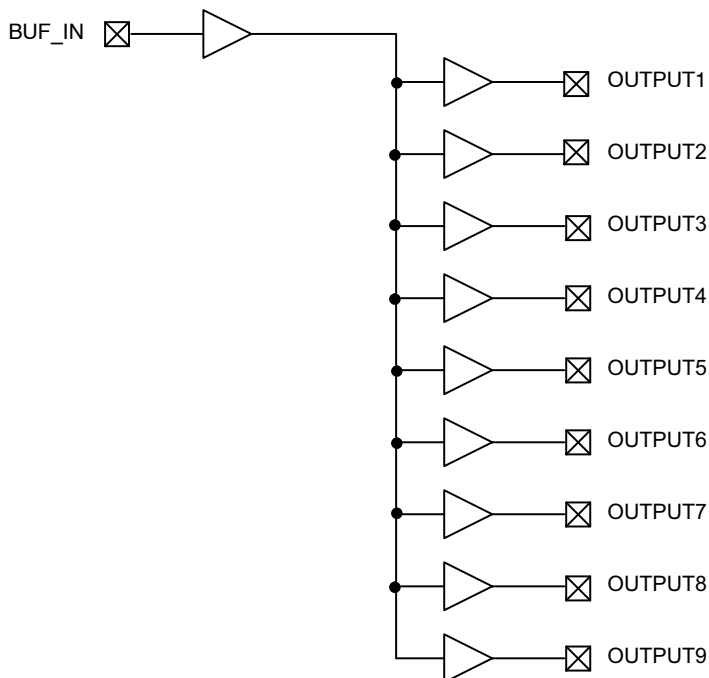
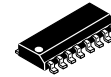


Figure 1. Block Diagram



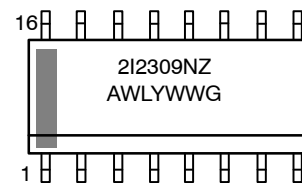
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SOIC-16  
CASE 751B-05

### MARKING DIAGRAM

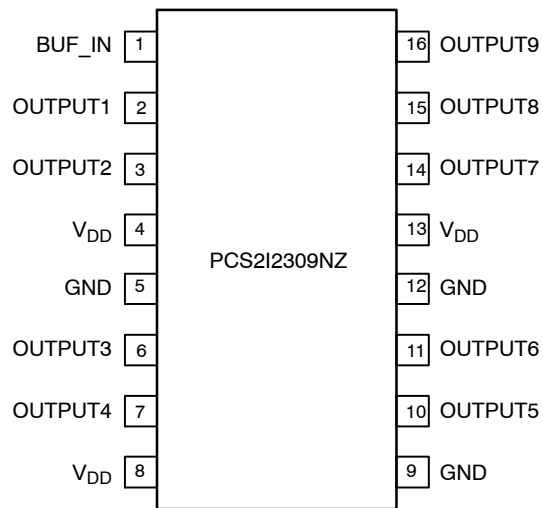


2I2309NZ= Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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**Figure 2. Pin Configuration**

**Table 1. PIN DESCRIPTION**

Pin #	Pin Name	Description
4, 8, 13	V <sub>DD</sub>	3.3 V Digital Supply Voltage
5, 9, 12	GND	Ground
1	BUF_IN	Input Clock
2, 3, 6, 7, 10, 11, 14, 15, 16	OUTPUT [1:9]	Outputs

**Table 2. ABSOLUTE MAXIMUM RATINGS**

Parameter	Min	Max	Unit
Supply Voltage to Ground Potential	-0.5	+4.6	V
DC Input Voltage (Except REF)	-0.5	V <sub>DD</sub> + 0.5	V
DC Input Voltage (REF)	-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

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**Table 3. OPERATING CONDITIONS**

Parameter	Description	Min	Max	Unit
V <sub>DD</sub>	Supply Voltage	3.0	3.6	V
T <sub>A</sub>	Operating Temperature	-40	+85	°C
C <sub>L</sub>	Load Capacitance, F <sub>out</sub> < 100 MHz		30	pF
	Load Capacitance, 100 MHz < F <sub>out</sub> < 133.33 MHz		15	pF
C <sub>IN</sub>	Input Capacitance		7	pF
BUF_IN, OUTPUT [1:9]	Operating Frequency	DC	133.33	MHz
t <sub>PU</sub>	Power-up time for all V <sub>DD</sub> 's to reach minimum specified voltage (power ramps must be monotonic)	0.05	50	mS

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**Table 4. ELECTRICAL CHARACTERISTICS**

Symbol	Parameter		Test Conditions	Min	Max	Units
V <sub>IL</sub>	Input LOW Voltage (Note 1)				0.8	V
V <sub>IH</sub>	Input HIGH Voltage (Note 1)			2.2		V
I <sub>IL</sub>	Input LOW Current		V <sub>IN</sub> = 0 V		50	μA
I <sub>IH</sub>	Input HIGH Current		V <sub>IN</sub> = V <sub>DD</sub>		100	μA
V <sub>OL</sub>	Output LOW Voltage (Note 2)		I <sub>OL</sub> = 8 mA		0.4	V
V <sub>OH</sub>	Output HIGH Voltage (Note 2)		I <sub>OH</sub> = -8 mA	2.4		V
I <sub>DD</sub>	Supply Current	0°C to +70°C	Unloaded outputs at 66.66 MHz		30	mA
		-40°C to +85°C			32	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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 tested in production.

**Table 5. SWITCHING CHARACTERISTICS** (Note 3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t <sub>3</sub>	Rise Time (Note 4)	Measured between 0.8 V and 2.0 V		1.5	2	nS
t <sub>4</sub>	Fall Time (Note 4)	Measured between 2.0 V and 0.8 V		1.5	2	nS
t <sub>D</sub>	Duty Cycle (Note 4) = t <sub>2</sub> ÷ t <sub>1</sub>	Measured at 1.4 V (For an Input Clock Duty Cycle 50%)	45	50	55	%
t <sub>5</sub>	Output to Output Skew (Note 4)	All outputs equally loaded			±250	pS
t <sub>6</sub>	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge (Note 4)	Measured at V <sub>DD</sub> /2		4	6	nS

3. All parameters specified with loaded outputs.

4. Parameter is guaranteed by design and characterization. It is not tested in production.

# PCS2I2309NZ

## Switching Waveforms

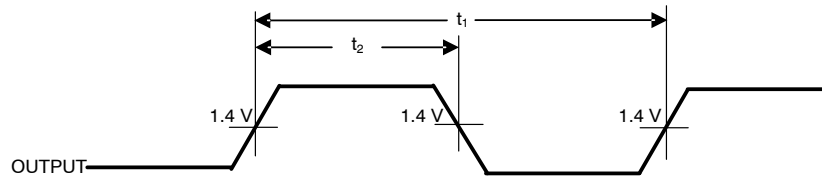


Figure 3. Duty Cycle Timing

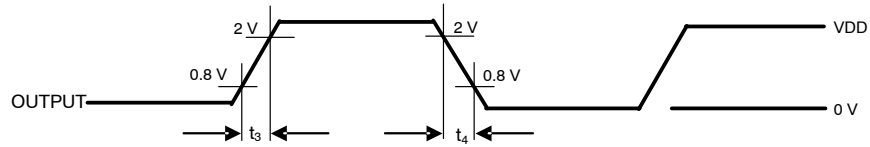


Figure 4. All Outputs Rise/Fall Time

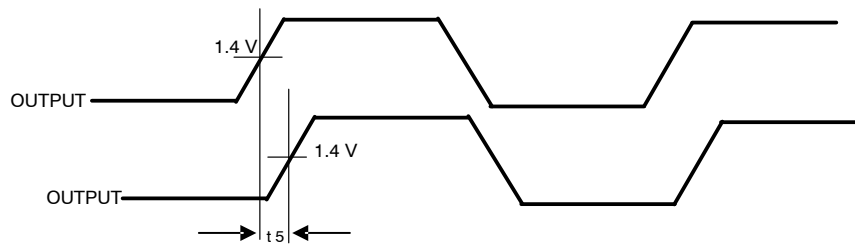


Figure 5. Output-Output Skew

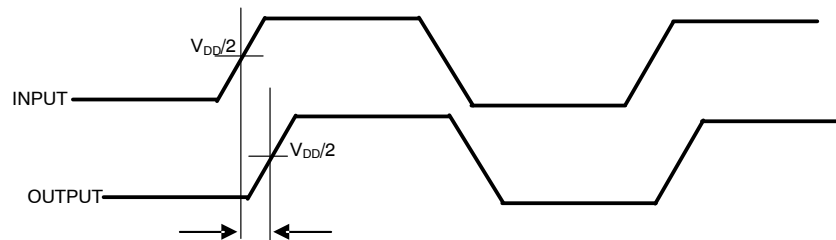


Figure 6. Input-Output Propagation Delay

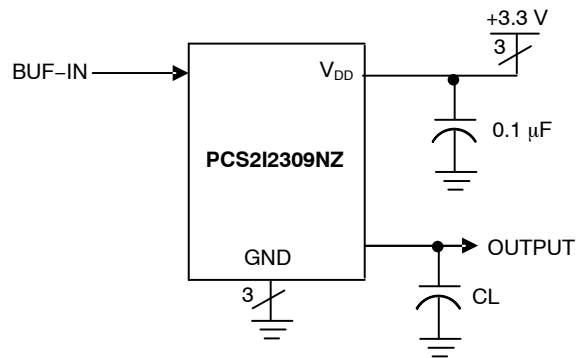


Figure 7. Test Circuit

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**Table 6. ORDERING INFORMATION**

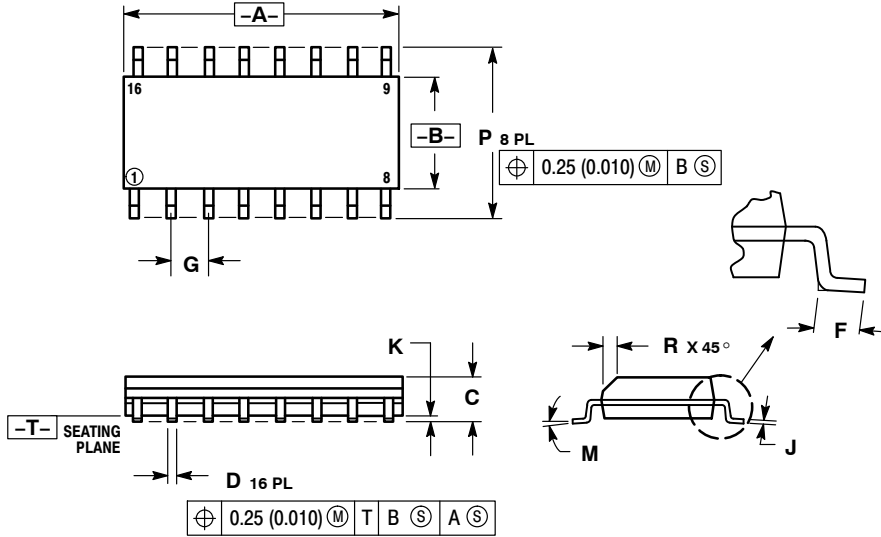
Part Number	Marking	Package Type	Temperature
P2I2309NZG-16-ST	2I2309NZ	16-pin 150-mil SOIC, Green	-40°C to +85°C
PCS2I2309NZG16SR	2I2309NZ	16-pin 150-mil SOIC, Tape and Reel, Green	-40°C to +85°C

NOTE: A "G" placed at the end of last row of marking or just below the last row toward the center of package indicates Pb-free for 16 pin SOIC packages.

# PCS2I2309NZ

## PACKAGE DIMENSIONS

SOIC-16  
CASE 751B-05  
ISSUE K

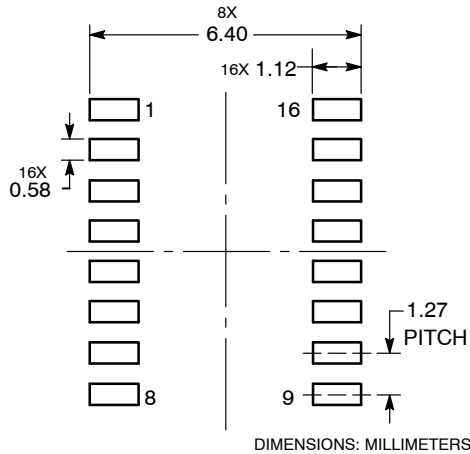


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

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