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Jameco Part Number 860756

# Nine-Output 3.3V Buffer

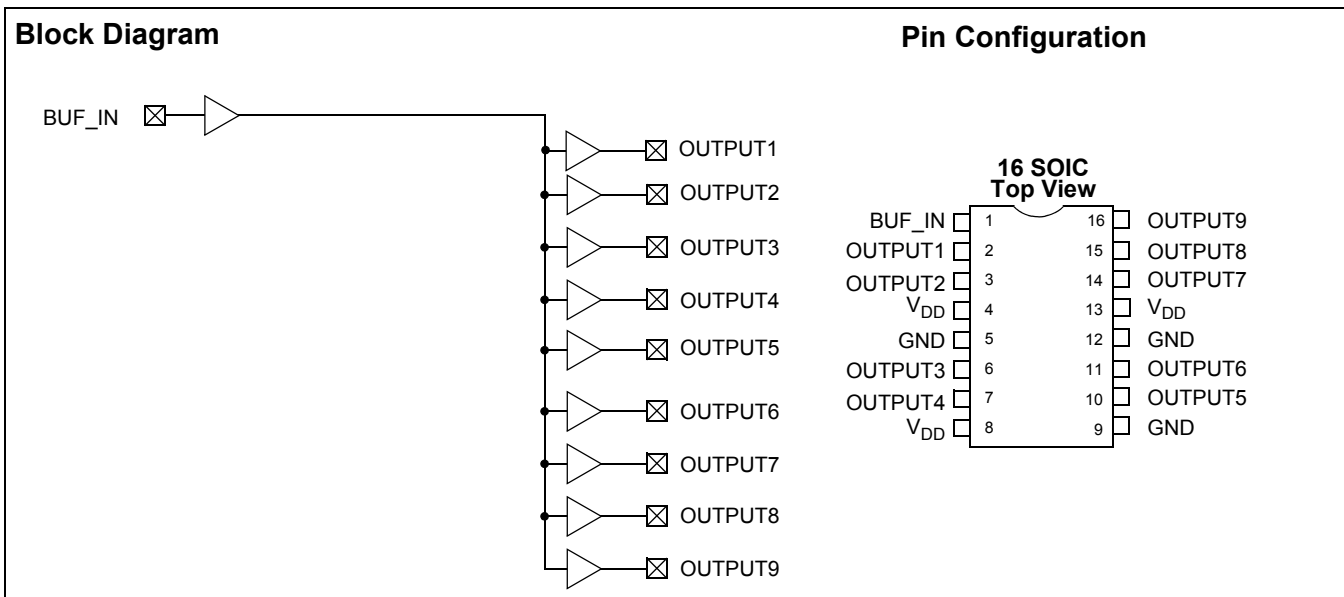
## Features

- One-input to nine-output buffer/driver
- Supports two DIMMs or four SO-DIMMs with one additional output for feedback to an external or chipset PLL
- Low power consumption for mobile applications
  - Less than 32 mA at 66.6 MHz with unloaded outputs
- 1-ns Input-Output delay
- Buffers all frequencies from DC to 133.33 MHz
- Output-output skew less than 250 ps
- Multiple  $V_{DD}$  and  $V_{SS}$  pins for noise and electromagnetic interference (EMI) reduction
- Space-saving 16-pin 150-mil SOIC package
- 3.3V operation
- Industrial temperature available

## Functional Description

The CY2309NZ is a low-cost buffer designed to distribute high-speed clocks in mobile PC systems and desktop PC systems with SDRAM support. The part has nine outputs, eight of which can be used to drive two DIMMs or four SO-DIMMs, and the remaining can be used for external feedback to a PLL. The device operates at 3.3V and outputs can run up to 133.33 MHz.

The CY2309NZ is designed for low EMI and power optimization. It has multiple  $V_{SS}$  and  $V_{DD}$  pins for noise 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 an ultra-compact 150-mil 16-pin SOIC package.



## Pin Description for CY2309NZ

Pin	Signal	Description
4, 8, 13	$V_{DD}$	3.3V Digital Voltage Supply
5, 9, 12	GND	Ground
1	BUF_IN	Input Clock
2, 3, 6, 7, 10, 11, 14, 15, 16	OUTPUT [1:9]	Outputs

**Maximum Ratings**

Supply Voltage to Ground Potential ..... -0.5V to +7.0V  
 DC Input Voltage (Except REF) ..... -0.5V to  $V_{DD} + 0.5V$   
 DC Input Voltage REF ..... -0.5V to 7V

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

**Operating Conditions** for Commercial and Industrial Temperature Devices

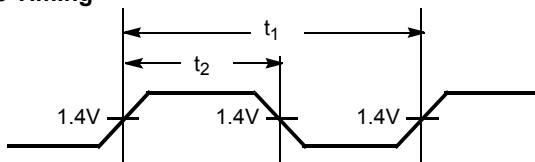
Parameter	Description	Min.	Max.	Unit
$V_{DD}$	Supply Voltage	3.0	3.6	V
$T_A$	(Ambient Operating Temperature) Commercial	0	70	°C
	(Ambient Operating Temperature) Industrial	-40	85	°C
$C_L$	Load Capacitance, $F_{out} < 100$ MHz		30	pF
	Load Capacitance, $100 \text{ MHz} < F_{out} < 133.33$ MHz		15	pF
$C_{IN}$	Input Capacitance		7	pF
BUF_IN, SDRAM [1:9]	Operating Frequency	DC	133.33	MHz
$t_{PU}$	Power-up time for all VDDs to reach minimum specified voltage (power ramps must be monotonic)	0.05	50	ms

**Electrical Characteristics** for Commercial and Industrial Temperature Devices

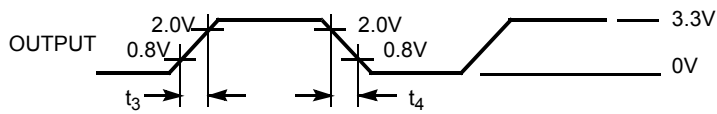
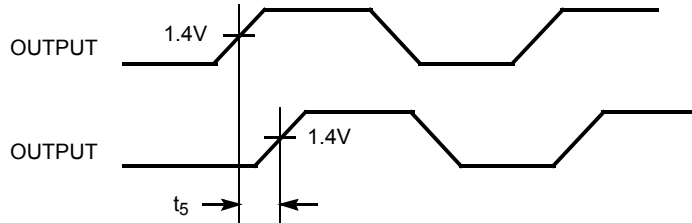
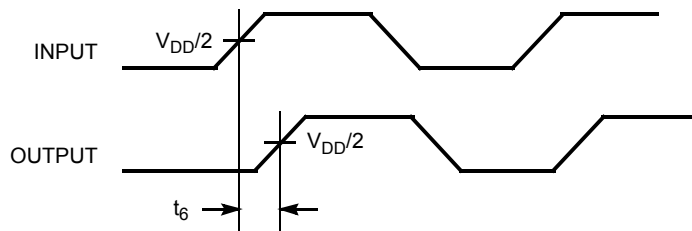
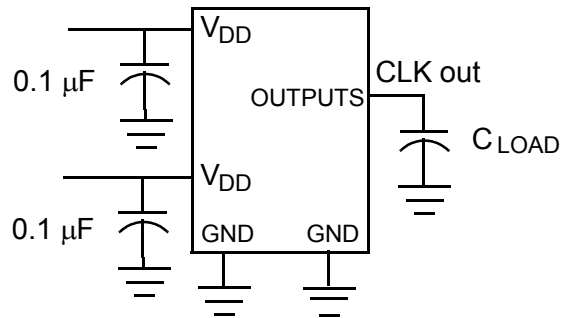
Parameter	Description	Test Conditions	Min.	Max.	Unit
$V_{IL}$	Input LOW Voltage <sup>[1]</sup>			0.8	V
$V_{IH}$	Input HIGH Voltage <sup>[1]</sup>		2.0		V
$I_{IL}$	Input LOW Current	$V_{IN} = 0V$		50.0	μA
$I_{IH}$	Input HIGH Current	$V_{IN} = V_{DD}$		100.0	μA
$V_{OL}$	Output LOW Voltage <sup>[2]</sup>	$I_{OL} = 8 \text{ mA}$		0.4	V
$V_{OH}$	Output HIGH Voltage <sup>[2]</sup>	$I_{OH} = -8 \text{ mA}$	2.4		V
$I_{DD}$	Supply Current	Unloaded outputs at 66.66 MHz		32	mA

**Switching Characteristics** for Commercial and Industrial Temperature Devices<sup>[3]</sup>

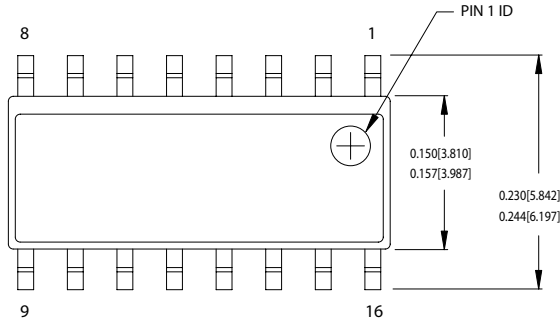
Parameter	Name	Description	Min.	Typ.	Max.	Unit
	Duty Cycle <sup>[2]</sup> = $t_2 \div t_1$	Measured at 1.4V	40.0	50.0	60.0	%
$t_3$	Rise Time <sup>[2]</sup>	Measured between 0.8V and 2.0V			1.50	ns
$t_4$	Fall Time <sup>[2]</sup>	Measured between 0.8V and 2.0V			1.50	ns
$t_5$	Output to Output Skew <sup>[2]</sup>	All outputs equally loaded			250	ps
$t_6$	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge <sup>[2]</sup>	Measured at $V_{DD}/2$	1	5	9.2	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**

**Test Circuits**

**Ordering Information**

Ordering Code	Package Type	Operating Range
CY2309NZSC-1H	16-pin 150-mil SOIC	Commercial
CY2309NZSC-1HT	16-pin 150-mil SOIC – Tape and Reel	Commercial
CY2309NZSI-1H	16-pin 150-mil SOIC	Industrial
CY2309NZSI-1HT	16-pin 150-mil SOIC – Tape and Reel	Industrial
<b>Lead-free</b>		
CY2309NZSXC-1H	16-pin 150-mil SOIC	Commercial
CY2309NZSXC-1HT	16-pin 150-mil SOIC – Tape and Reel	Commercial
CY2309NZSXI-1H	16-pin 150-mil SOIC	Industrial
CY2309NZSXI-1HT	16-pin 150-mil SOIC – Tape and Reel	Industrial

**Package Diagram**
**16-Lead (150-Mil) SOIC S16**


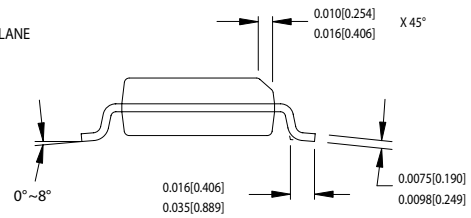
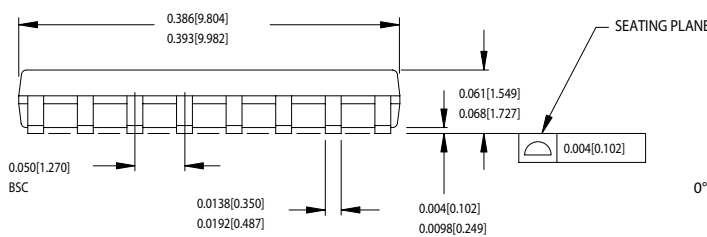
DIMENSIONS IN INCHES[MM] MIN.

MAX.

REFERENCE JEDEC MS-012

PACKAGE WEIGHT 0.15gms

PART #	
S16.15	STANDARD PKG.
SZ16.15	LEAD FREE PKG.



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**Document History Page**

<b>Document Title: CY2309NZ Nine-Output 3.3V Buffer</b>				
<b>Document Number: 38-07182</b>				
<b>REV.</b>	<b>ECN NO.</b>	<b>Issue Date</b>	<b>Orig. of Change</b>	<b>Description of Change</b>
**	111858	12/09/01	DSG	Change from Spec number: 38-00709 to 38-07182
*A	121834	12/14/02	RBI	Power-up requirements added to Operating Conditions Information
*B	130563	10/23/03	SDR	Added industrial operating temperature to operating conditions
*C	212991	See ECN	RGL/GGK	Updated the propagation delay $T_6$ spec to 9.2 ns in the Switching Characteristics table
*D	270149	See ECN	RGL	Added Lead-free devices Replaced 8.7ns Input/Output Delay to 1ns Input/Output Delay in the features section