



CYPRESS

CY2309NZ

Nine Output, 3.3V Buffer

Features

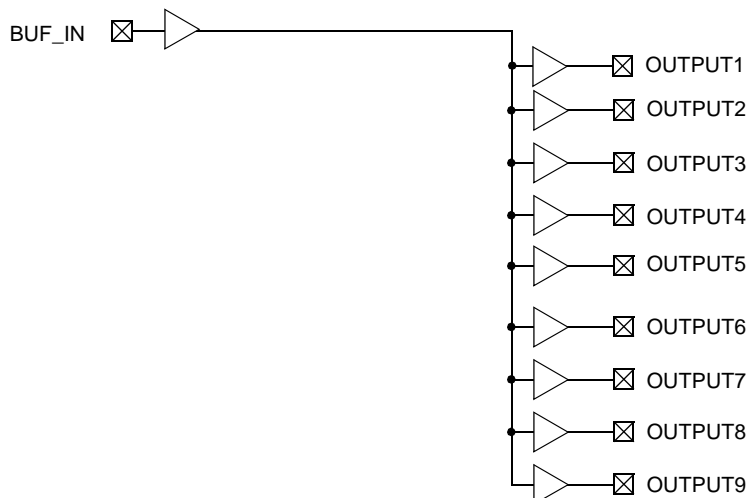
- One input to nine output buffer/driver
- Supports two DIMMs or four SO-DIMMs with one additional output for feedback to an external or chipset PLL
- Low power consumption for mobile applications
 - less than 32 mA at 66.6 MHz with unloaded outputs
- 8.7-ns Input-Output delay
- Buffers all frequencies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

Functional Description

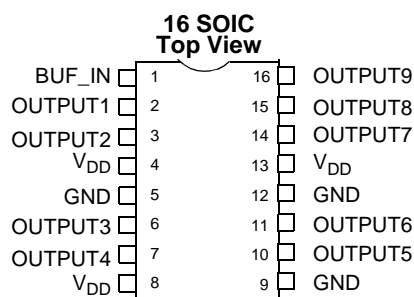
The CY2309NZ is a low-cost buffer designed to distribute high-speed clocks in mobile PC systems and desktop PC systems with SDRAM support. The part has nine outputs, eight of which can be used to drive 2 DIMMs or 4 SO-DIMMs, and the remaining can be used for external feedback to a PLL. The device operates 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.

Block Diagram



Pin Configuration



Pin Description for CY2309NZ

Signal	Pin	Description
V_{DD}	4, 8, 13	3.3V Digital Voltage Supply
GND	5, 9, 12	Ground
BUF_IN	1	Input Clock
OUTPUT [1:9]	2, 3, 6, 7, 10, 11, 14, 15, 16	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
 Max. Soldering Temperature (10 sec.) 260°C
 Junction Temperature 150°C
 Static Discharge Voltage
 (per MIL-STD-883, Method 3015) >2,000V

Operating Conditions for Commercial Temperature Devices

Parameter	Description	Min.	Max.	Unit
V_{DD}	Supply Voltage	3.0	3.6	V
T_A	Operating Temperature (Ambient Temperature)	0	70	°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

Electrical Characteristics for Commercial and Industrial Temperature Devices

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	$V_{IN} = 0V$		50.0	μA
I_{IH}	Input HIGH Current	$V_{IN} = V_{DD}$		100.0	μA
V_{OL}	Output LOW Voltage ^[2]	$I_{OL} = 8 \text{ mA}$		0.4	V
V_{OH}	Output HIGH Voltage ^[2]	$I_{OH} = -8 \text{ mA}$	2.4		V
I_{DD}	Supply Current	Unloaded outputs at 66.66 MHz		32	mA

Switching Characteristics^[3] for Commercial and Industrial Temperature Devices

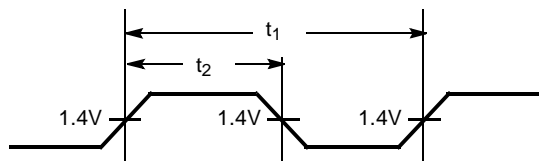
Parameter	Name	Description	Min.	Typ.	Max.	Unit
	Duty Cycle ^[2] = $t_2 \div t_1$	Measured at 1.4V	40.0	50.0	60.0	%
t_3	Rise Time ^[2]	Measured between 0.8V and 2.0V			1.50	ns
t_4	Fall Time ^[2]	Measured between 0.8V and 2.0V			1.50	ns
t_5	Output to Output Skew ^[2]	All outputs equally loaded			250	ps
t_6	Propagation Delay, BUF_IN Rising Edge to OUTPUT Rising Edge ^[2]	Measured at $V_{DD}/2$	1	5	8.7	ns

Notes:

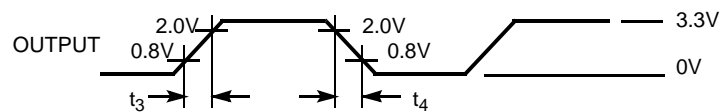
1. BUF_IN input has a threshold voltage of $V_{DD}/2$.
2. Parameter is guaranteed by design and characterization. It is not 100% tested in production.
3. All parameters specified with loaded outputs.

Switching Waveforms

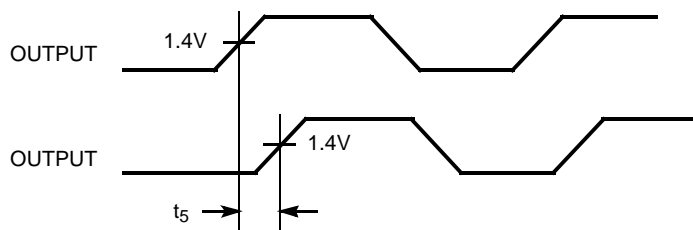
Duty Cycle Timing



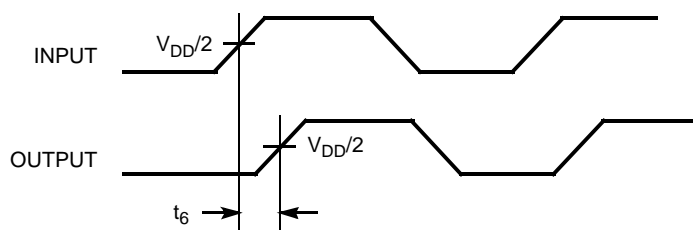
All Outputs Rise/Fall Time



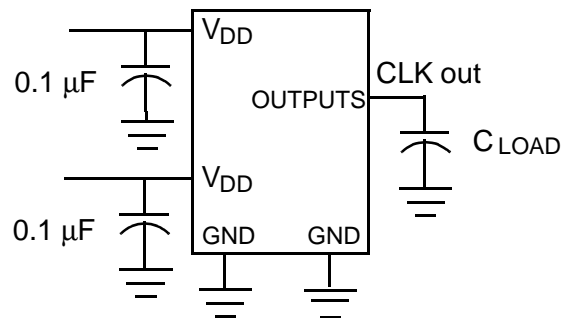
Output-Output Skew



Input-Output Propagation Delay



Test Circuits



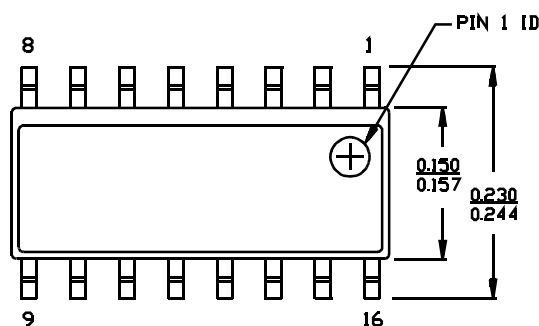
Ordering Information

Ordering Code	Package Name	Package Type	Operating Range
CY2309NZSC-1H	S16	16-pin 150-mil SOIC	Commercial
CY2309NZSI-1H	S16	16-pin 150-mil SOIC	Industrial

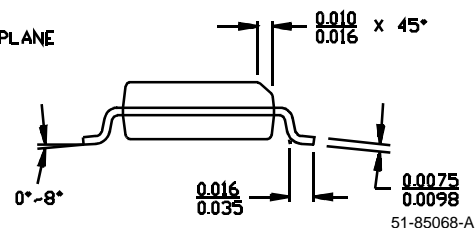
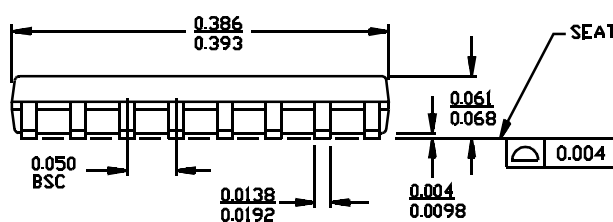
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Package Diagram

16-Lead (150-Mil) Molded SOIC S16



DIMENSIONS IN INCHES MIN.
MAX.



51-85068-A