

NINE OUTPUT 3.3V CLOCK BUFFER

IDT2309NZ

FEATURES:

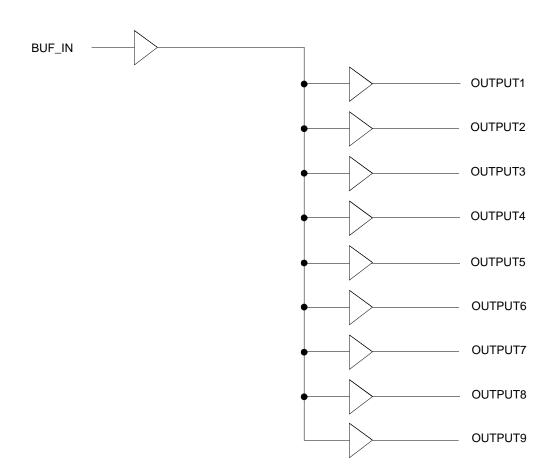
- · One input to nine output buffer/driver
- Supports two DIMMs or four SO-DIMMs with one additional output for feedback to an external or chipset PLL
- Low power consumption for mobile applications: less than 32mA at 66.6MHz with unloaded outputs
- · 8.7ns input-output delay
- · Buffers all frequencies from DC to 133.33MHz
- Output-output skew < 250ps
- · Multiple VDD and Vss pins for noise and EMI reduction
- 3.3V operation
- · High drive capability
- · Available in SOIC and TSSOP packages

DESCRIPTION:

The IDT2309NZ is a low-cost buffer designed to distribute high-speed clocks in mobile PC systems and desktop PC systems with SDRAM support. This 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 IDT2309NZ operates at 3.3V and outputs can run up to 133.33MHz

The IDT2309NZ is designed for low EMI and power optimization. It has multiple V_{DD} and V_{SS} pins for noise optimization and consumes less than 32mA at 66.6MHz, making it ideal for the low power requirements of mobile systems.

FUNCTIONAL BLOCK DIAGRAM

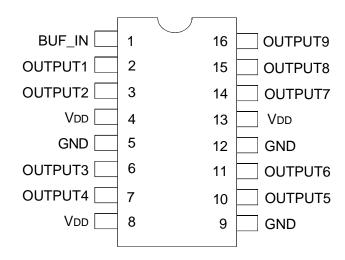


The IDT logo is a registered trademark of Integrated Device Technology, Inc.

COMMERCIAL AND INDUSTRIAL TEMPERATURE RANGES

FEBRUARY 2003

PIN CONFIGURATION



SOIC/ TSSOP TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Max.	Unit
VDD	Supply Voltage Range	-0.5 to +4.6	V
VI ⁽²⁾	Input Voltage Range (REF)	-0.5 to +5.5	V
VI	Input Voltage Range	-0.5 to	V
	(except REF)	VDD+0.5	
IIK (VI < 0)	Input Clamp Current	-50	mA
Io (Vo = 0 to VDD)	Continuous Output Current	±50	mA
VDD or GND	Continuous Current	±100	mA
TA = 55°C	Maximum Power Dissipation	0.7	W
(in still air) ⁽³⁾			
Tstg	Storage Temperature Range	-65 to +150	°C
Operating	Commercial Temperature	0 to +70	°C
Temperature	Range		
Operating	Industrial Temperature	-40 to +85	°C
Temperature	Range		

NOTES

- 1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
- The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

PIN DESCRIPTION

Pin Name	Pin Number	Functional Description
Vdd	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	Outputs
	11, 14, 15, 16	

OPERATING CONDITIONS - COMMERCIAL

Symbol	Parameter	Min.	Max.	Unit
VDD	Supply Voltage	3	3.6	V
TA	TA Operating Temperature (Ambient Temperature)		70	°C
CL	CL Load Capacitance, Fout < 100MHz		30	pF
	Load Capacitance 100MHz < Fout < 133.33MHz	_	15	
CIN	Input Capacitance	_	7	pF
BUF_IN, SDRAM[1:9]	Operating Frequency	DC	133.33	MHz

OPERATING CONDITIONS - INDUSTRIAL

Symbol Parameter		Min.	Max.	Unit
VDD	Supply Voltage	3	3.6	V
TA	TA Operating Temperature (Ambient Temperature)		+85	°C
CL	Load Capacitance, Fout < 100MHz		30	pF
	Load Capacitance 100MHz < Fout < 133.33MHz	_	15	
Cin	Input Capacitance	_	7	pF
BUF_IN, SDRAM[1:9]	Operating Frequency	DC	133.33	MHz

DC ELECTRICAL CHARACTERISTICS - COMMERCIAL

Symbol	Parameter	Conditions	Min.	Max.	Unit
VIL	Input LOW Voltage(1)		_	0.8	V
Vih	Input HIGH Voltage ⁽¹⁾		2	_	V
lıL	Input LOW Current	VIN = 0V	_	50	μΑ
Іін	Input HIGH Current	VIN = VDD	_	100	μA
Vol	Output LOW Voltage ⁽²⁾	Iol = 8mA	_	0.4	V
Vон	Output HIGH Voltage ⁽²⁾	Iон = -8mA	2.4	_	V
IDD	Supply Current	Unloaded Outputs at 66.66MHz	_	32	mA

NOTES:

- 1. BUF_IN input has a threshold voltage of VDD/2.
- 2. Parameter is guaranteed by design but not production tested.

DC ELECTRICAL CHARACTERISTICS - INDUSTRIAL

Symbol	Parameter	Conditions	Min.	Max.	Unit
VIL	Input LOW Voltage ⁽¹⁾			0.8	V
VIH	Input HIGH Voltage ⁽¹⁾		2	_	V
lıL	Input LOW Current	VIN = 0V		50	μΑ
Іін	Input HIGH Current	VIN = VDD		100	μA
Vol	Output LOW Voltage ⁽²⁾	Iol = 8mA		0.4	V
Voн	Output HIGH Voltage ⁽²⁾	loн = -8mA	2.4	ı	V
ldd	Supply Current	Unloaded Outputs at 66.66MHz	_	35	mA

NOTES:

- 1. BUF_IN input has a threshold voltage of VDD/2.
- 2. Parameter is guaranteed by design but not production tested.

SWITCHING CHARACTERISTICS - COMMERCIAL (1)

Symbol	Parameter ⁽²⁾	Conditions	Min.	Тур.	Max.	Unit
t3	Rise Time	Measured between 0.8V and 2V	_	_	1.5	ns
t4	FallTime	Measured between 0.8V and 2V	_	_	1.5	ns
t5	Output to Output Skew	All outputs equally loaded	_	_	250	ps
t6	Propagation Delay, BUF_IN Rising Edge	Measured at VDD/2	1	5	8.7	ns
	to OUTPUT Rising Edge					

NOTES

- 1. All parameters specified with loaded outputs.
- 2. Parameter is guaranteed by design but not production tested.

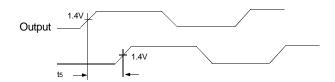
SWITCHING CHARACTERISTICS - INDUSTRIAL (1)

Symbol	Parameter ⁽²⁾	Conditions	Min.	Тур.	Max.	Unit
ts	Rise Time	Measured between 0.8V and 2V	_	_	1.5	ns
t4	FallTime	Measured between 0.8V and 2V	_	_	1.5	ns
t5	Output to Output Skew	All outputs equally loaded		_	250	ps
t6	Propagation Delay, BUF_IN Rising Edge	Measured at VDD/2	1	5	8.7	ns
	to OUTPUT Rising Edge					

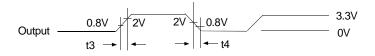
NOTES:

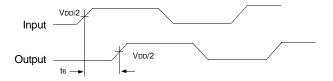
- 1. All parameters specified with loaded outputs.
- 2. Parameter is guaranteed by design but not production tested.

SWITCHING WAVEFORMS



Output to Output Skew

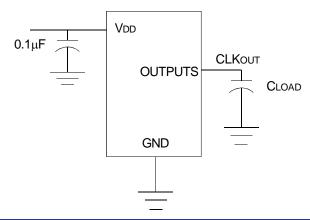




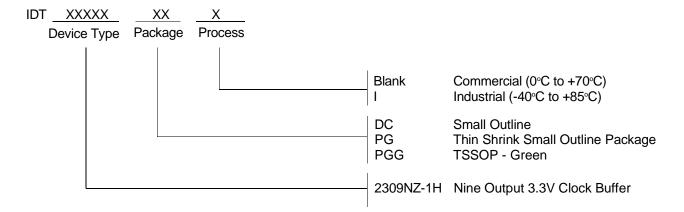
All Outputs Rise/Fall Time

Input to Output Propagation Delay

TEST CIRCUIT



ORDERING INFORMATION





2975 Stender Way Santa Clara, CA 95054 for SALES: 800-345-7015 or 408-727-6116 fax: 408-492-8674 www.idt.com for Tech Support: logichelp@idt.com (408) 654-6459