

- **EPIC™ (Enhanced-Performance Implanted CMOS) Submicron Process**
- **Typical  $V_{OLP}$  (Output Ground Bounce)**  
 $< 0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- **Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)**  
 $> 2$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- **Latch-Up Performance Exceeds 250 mA**  
Per JEDEC Standard JESD-17
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages**

#### description

This 10-bit buffer/bus driver is designed for 2.7-V to 3.6-V  $V_{CC}$  operation.

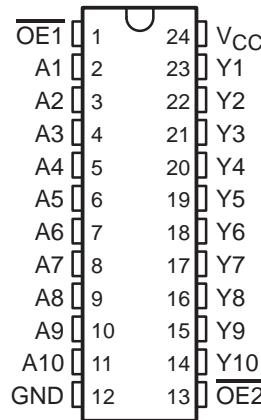
The SN74LVC828 provides a high-performance bus interface for wide datapaths or buses carrying parity.

The 3-state control gate is a 2-input AND gate with active-low inputs so that if either output-enable ( $\overline{OE1}$  or  $\overline{OE2}$ ) input is high, all ten outputs are in the high-impedance state. The SN74LVC828 provides inverting data at its outputs.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN74LVC828 is characterized for operation from  $-40^\circ\text{C}$  to  $85^\circ\text{C}$ .

DB, DW, OR PW PACKAGE  
(TOP VIEW)



FUNCTION TABLE

INPUTS			OUTPUT
OE1	OE2	A	Y
L	L	L	H
L	L	H	L
H	X	X	Z
X	H	X	Z



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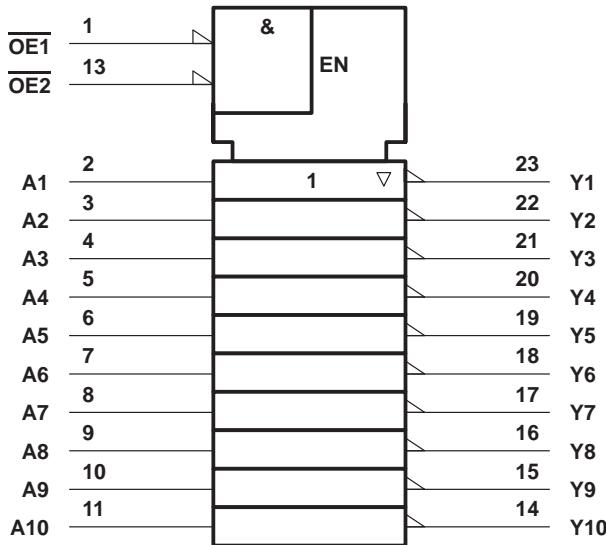
# **SN74LVC828**

## **10-BIT BUFFER/DRIVER**

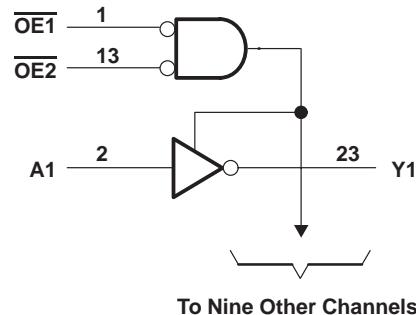
## **WITH 3-STATE OUTPUTS**

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## logic symbol†



## logic diagram (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡**

Supply voltage range, $V_{CC}$ .....	-0.5 V to 4.6 V
Input voltage range, $V_I$ (see Note 1) .....	-0.5 V to 6.5 V
Output voltage range, $V_O$ (see Notes 1 and 2) .....	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	-50 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	±50 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	±50 mA
Continuous current through $V_{CC}$ or GND .....	±100 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 3):	
DB package .....	0.65 W
DW package .....	1.7 W
PW package .....	0.7 W
Storage temperature range, $T_{Stg}$ .....	-65°C to 150°C

‡ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils. For more information, refer to the *Package Thermal Considerations* application note in the 1994 ABT Advanced BiCMOS Technology Data Book, literature number SCBD002B.

**recommended operating conditions (see Note 4)**

			MIN	MAX	UNIT
$V_{CC}$	Supply voltage		2.7	3.6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2.7\text{ V to }3.6\text{ V}$	2		V
$V_{IL}$	Low-level input voltage	$V_{CC} = 2.7\text{ V to }3.6\text{ V}$		0.8	V
$V_I$	Input voltage		0	5.5	V
$V_O$	Output voltage		0	$V_{CC}$	V
$I_{OH}$	High-level output current	$V_{CC} = 2.7\text{ V}$		-12	mA
		$V_{CC} = 3\text{ V}$		-24	
$I_{OL}$	Low-level output current	$V_{CC} = 2.7\text{ V}$		12	mA
		$V_{CC} = 3\text{ V}$		24	
$\Delta t/\Delta v$	Input transition rise or fall rate		0	10	ns/V
$T_A$	Operating free-air temperature		-40	85	°C

NOTE 4: Unused inputs must be held high or low to prevent them from floating.

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER	TEST CONDITIONS	$V_{CC}^{\dagger}$	MIN	TYP‡	MAX	UNIT
$V_{OH}$	$I_{OH} = -100\text{ }\mu\text{A}$	MIN to MAX	$V_{CC} - 0.2$			V
	$I_{OH} = -12\text{ mA}$	2.7 V	2.2			
	$I_{OH} = -24\text{ mA}$	3 V	2.4			
$V_{OL}$	$I_{OL} = 100\text{ }\mu\text{A}$	MIN to MAX		0.2		V
	$I_{OL} = 12\text{ mA}$	2.7 V		0.4		
	$I_{OL} = 24\text{ mA}$	3 V		0.55		
$I_I$	$V_I = 5.5\text{ V or GND}$	3.6 V		$\pm 5$	$\mu\text{A}$	
$I_{OZ}$	$V_O = V_{CC}$ or GND	3.6 V		$\pm 10$	$\mu\text{A}$	
$I_{CC}$	$V_I = V_{CC}$ or GND, $I_O = 0$	3.6 V		20	$\mu\text{A}$	
$\Delta I_{CC}$	One input at $V_{CC} - 0.6\text{ V}$ , Other inputs at $V_{CC}$ or GND	3 V to 3.6 V		500	$\mu\text{A}$	
$C_i$	$V_I = V_{CC}$ or GND	3.3 V		9	pF	
$C_o$	$V_O = V_{CC}$ or GND	3.3 V		10	pF	

† For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 3.3\text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

**switching characteristics over recommended operating free-air temperature range,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 2.7\text{ V}$		UNIT
			MIN	MAX	MIN	MAX	
$t_{pd}$	A	Y	1.5	8		9	ns
$t_{en}$	$\overline{OE}$	Y	1.5	9		10	ns
$t_{dis}$	$\overline{OE}$	Y	1.5	8		9	ns

# SN74LVC828

## 10-BIT BUFFER/DRIVER

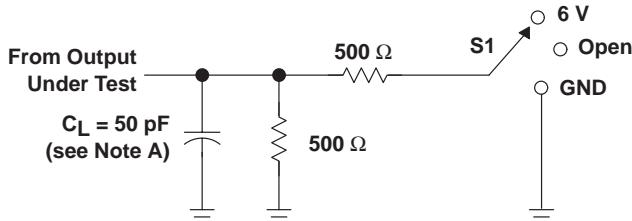
### WITH 3-STATE OUTPUTS

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operating characteristics,  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$

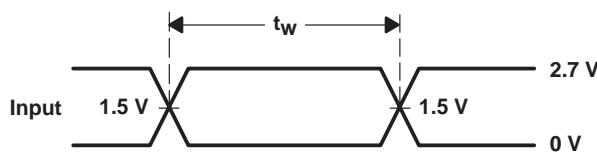
PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance per buffer/driver	Outputs enabled	27	pF
		Outputs disabled	2.4	

### PARAMETER MEASUREMENT INFORMATION

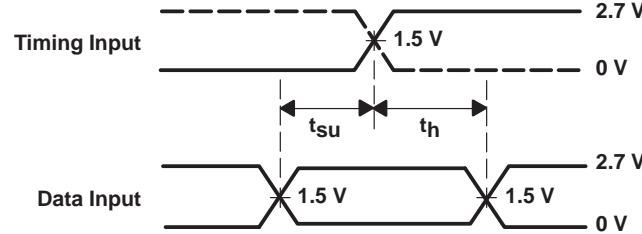


TEST	S1
$t_{pd}$	Open
$t_{PLZ}/t_{PZL}$	6 V
$t_{PHZ}/t_{PZH}$	GND

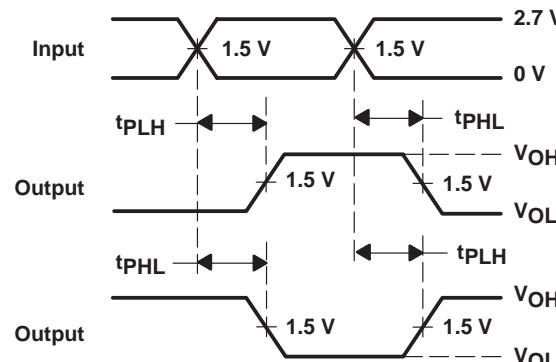
#### LOAD CIRCUIT FOR OUTPUTS



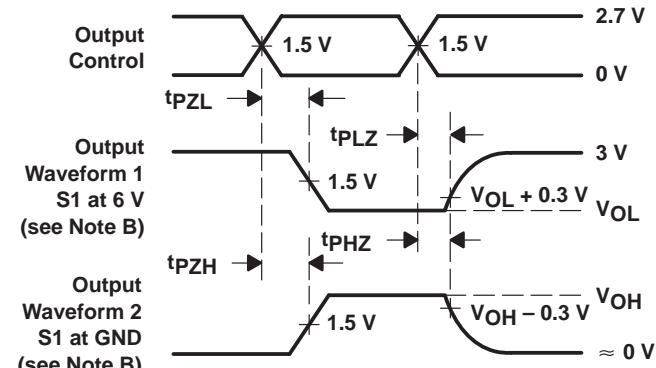
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

NOTES:

- $C_L$  includes probe and jig capacitance.
- Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10$  MHz,  $Z_O = 50 \Omega$ ,  $t_f \leq 2.5$  ns,  $t_r \leq 2.5$  ns.
- The outputs are measured one at a time with one transition per measurement.
- $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

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