D2977, APRIL 1987–REVISED MAY 1988

- **BiCMOS Design Substantially Reduces Standby Current**
- **Functionally Equivalent to AM29827, AM29828, SN74ALS29827, and SN74ALS29828**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **P-N-P Inputs Reduce DC Loading**
- **Data Flow-Thru Pinout (All Inputs on Opposite Side from Outputs)**
- **Power-Up High-Impedance State**
- **Package Options Include Plastic Chip Carriers, in Addition to Plastic and Ceramic DIPs**
- **BiCMOS Process with TTL Inputs and Outputs**
- **Dependable Texas Instruments Quality and Reliability**

description

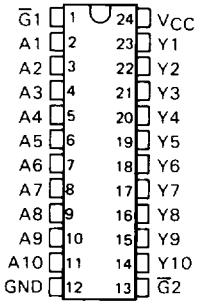
These 10-bit buffers and bus drivers provide high-performance bus interface for wide data paths or buses carrying parity.

The 3-state control gate is a 2-input positive NOR gate so if either $\overline{G}1$ or $\overline{G}2$ is high, all 10 outputs are in the high-impedance state. The outputs are also in the high-impedance state during power-up and power-down conditions. The outputs remain in the high-impedance state while the device is powered-down.

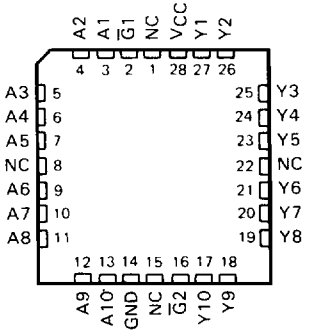
The SN74BCT29827A provides true data and the SN74BCT29828A provides inverted data at the outputs.

The SN74BCT29827A and SN74BCT29828A are characterized for operation from 0°C to 70°C.

DW OR NT PACKAGE
(TOP VIEW)



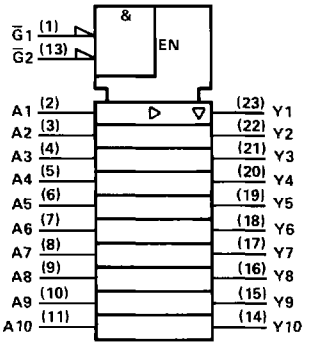
FN PACKAGE
(TOP VIEW)



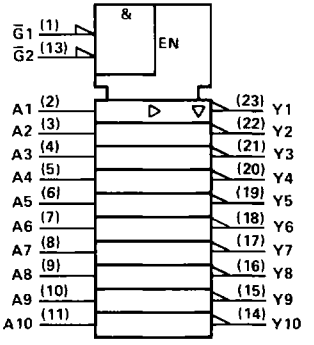
NC – No internal connection

logic symbols†

SN74BCT29827A



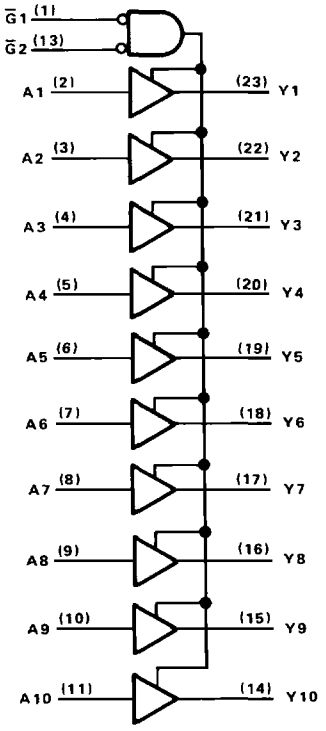
SN74BCT29828A



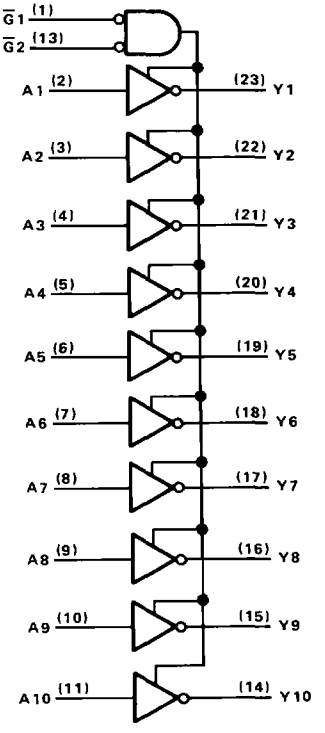
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)

SN74BCT29827A



SN74BCT29828A



Pin numbers shown are for DW and NT packages.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage (all inputs and I/O ports) . . . . . 5.5 V
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			−24	mA
I_{OL}	Low-level output current			48	mA
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER	TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = −18 mA			−1.2	V
V_{OH}	V_{CC} = MIN	I_{OH} = −15 mA	2.4			V
		I_{OH} = −24 mA	2			
V_{OL}	V_{CC} = MIN,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}	V_{CC} = MAX,	V_O = 2.7 V			20	μA
I_{OZL}	V_{CC} = MAX,	V_O = 0.4 V			−20	μA
I_I	V_{CC} = MAX,	V_I = 5.5 V			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V			20	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V			−0.2	mA
I_{OS}§	V_{CC} = MAX,	V_O = 0	−75		−250	mA
I_{CCL}	V_{CC} = MAX,	Outputs open		28	40	mA
I_{CCZ}	V_{CC} = MAX,	Outputs open		3.5	6	mA

† For conditions shown as MIN or MAX, use appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time and duration of the short circuit should not exceed 1 second.

switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A	Y		3.5	6		7	ns
t_{PHL}				5	7		9	
t_{PZH}	$\overline{G}$	Y		7	10		12	ns
t_{PZL}				10	13		15	
t_{PHZ}	$\overline{G}$	Y		7	10		12	ns
t_{PLZ}				7	10		12	

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage (all inputs and I/O ports) . . . . . 5.5 V
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

		MIN	NOM	MAX	UNIT
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electrical characteristics over recommended operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = −18 mA			−1.2	V
V_{OH}	V_{CC} = MIN	I_{OH} = −15 mA	2.4			V
		I_{OH} = −24 mA	2			
V_{OL}	V_{CC} = MIN,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}	V_{CC} = MAX,	V_O = 2.7 V			20	μA
I_{OZL}	V_{CC} = MAX,	V_O = 0.4 V			−20	μA
I_I	V_{CC} = MAX,	V_I = 5.5 V			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V			20	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V			−0.2	mA
I_{OS}§	V_{CC} = MAX,	V_O = 0	−75		−250	mA
I_{CCL}	V_{CC} = MAX,	Outputs open		28	40	mA
I_{CCZ}	V_{CC} = MAX,	Outputs open		3.5	6.5	mA

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switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX		UNIT
			MIN	TYP	MAX	MIN	MAX	
t_{PLH}	A	Y		3.5	6		7	ns
t_{PHL}				3.5	6		7	
t_{PZH}	$\overline{G}$	Y		7	9		11	ns
t_{PZL}				9	13		15	
t_{PHZ}	$\overline{G}$	Y		6	9		10	ns
t_{PLZ}				6	10		11	

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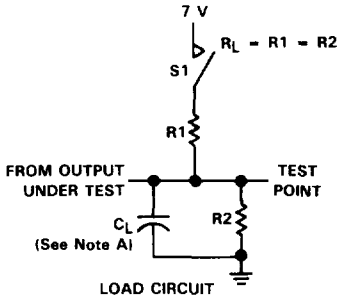
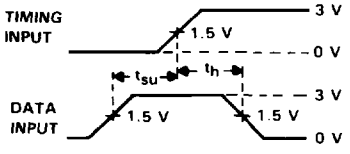
PARAMETER MEASUREMENT INFORMATION



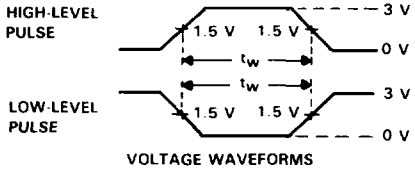
LOAD CIRCUIT

SWITCH POSITION TABLE

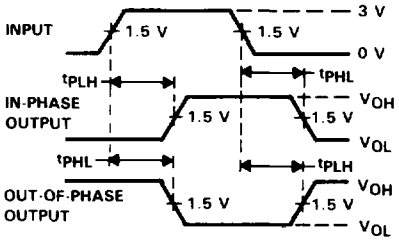
TEST	S1
t_{PLH}	Open
t_{PHL}	Open
t_{PZH}	Open
t_{PZL}	Closed
t_{PHZ}	Closed
t_{PLZ}	Closed



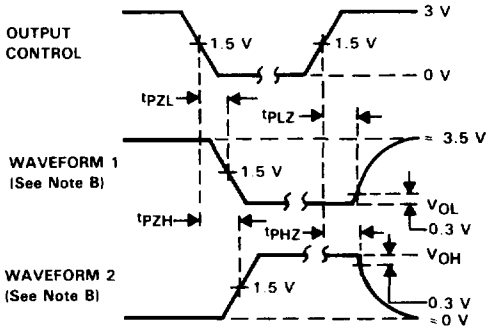
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, THREE-STATE OUTPUTS

NOTES: A. C_L includes probe and jig capacitance.
B. 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.
C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.