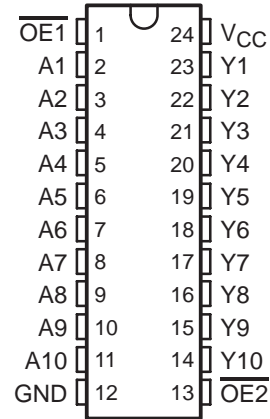# SN54BCT2827C, SN74BCT2827C
10-BIT BUS/MOS MEMORY DRIVERS
WITH 3-STATE OUTPUTS
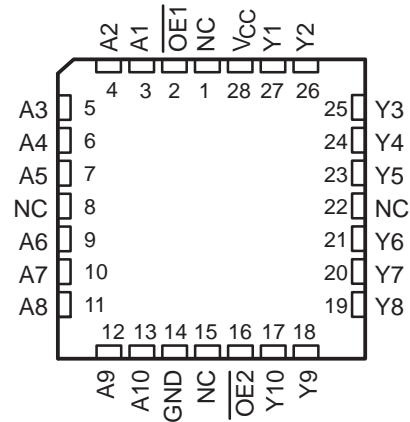
SCBS007E – APRIL 1987 – REVISED NOVEMBER 1993

- **BiCMOS Design Substantially Reduces I$_{CCZ}$**
- **Output Ports Have Equivalent 25-Ω Resistors; No External Resistors Are Required**
- **Specifically Designed to Drive MOS DRAMs**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Power-Up High-Impedance State**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015**
- **Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic and Ceramic 300-mil DIPs (JT, NT)**

description

These 10-bit buffers and bus drivers are specifically designed to drive the capacitive input characteristics of MOS DRAMs. They provide high-performance bus interface for wide data paths or buses carrying parity.

The 3-state control gate is a 2-input AND gate with active-low inputs so if either output-enable ($\overline{OE1}$ or $\overline{OE2}$) input is high, all ten 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 SN54BCT2827C is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74BCT2827C is characterized for operation from 0°C to 70°C.
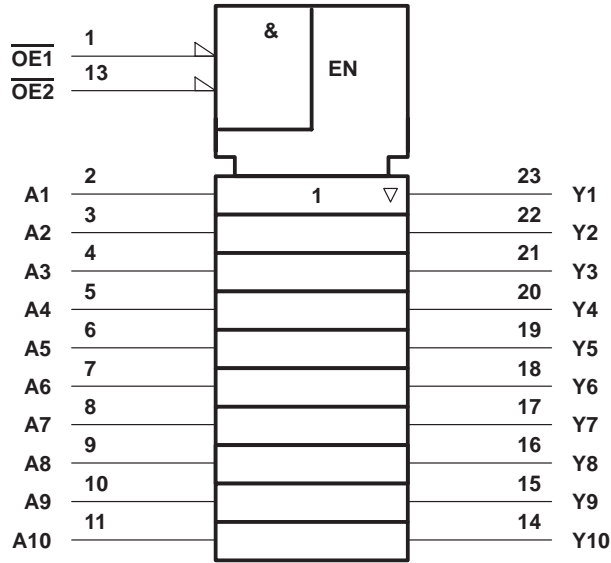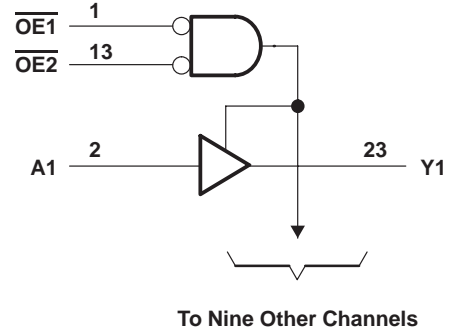
SN54BCT2827C . . . JT OR W PACKAGE
SN74BCT2827C . . . DW OR NT PACKAGE
(TOP VIEW)

$\overline{OE1}$	1		24	V$_{CC}$
A1	2		23	Y1
A2	3		22	Y2
A3	4		21	Y3
A4	5		20	Y4
A5	6		19	Y5
A6	7		18	Y6
A7	8		17	Y7
A8	9		16	Y8
A9	10		15	Y9
A10	11		14	Y10
GND	12		13	$\overline{OE2}$

SN54BCT2827C . . . FK PACKAGE
(TOP VIEW)

Top pins: A2 (4), A1 (3), $\overline{OE1}$ (2), NC (1), V$_{CC}$ (28), Y1 (27), Y2 (26)

Left	Pin		Pin	Right
A3	5		25	Y3
A4	6		24	Y4
A5	7		23	Y5
NC	8		22	NC
A6	9		21	Y6
A7	10		20	Y7
A8	11		19	Y8

Bottom pins: A9 (12), A10 (13), GND (14), NC (15), $\overline{OE2}$ (16), Y10 (17), Y9 (18)

NC - No internal connection

FUNCTION TABLE

INPUTS			OUTPUT
$\overline{OE1}$	$\overline{OE2}$	A	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

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TEXAS INSTRUMENTS

SN54BCT2827C, SN74BCT2827C
10-BIT BUS/MOS MEMORY DRIVERS
WITH 3-STATE OUTPUTS

logic symbol†

logic diagram (positive logic)

To Nine Other Channels

† This symbol is in accordance with ANSI/IEEE Std 91-1984
 and IEC Publication 617-12.
Pin numbers shown are for the DW, JT, NT, and W packages.

schematic of each output
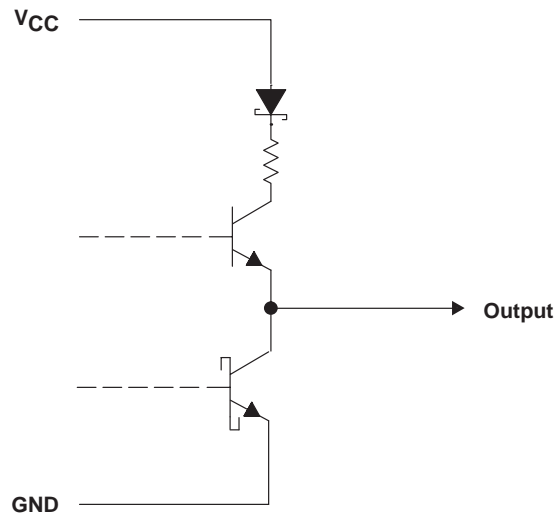
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V_{CC} .... −0.5 V to 7 V
Input voltage range, V_I (see Note 1) .... −0.5 V to 7 V
Voltage range applied to any output in the disabled or power-off state, V_O .... −0.5 V to 5.5 V
Voltage range applied to any output in the high state, V_O .... −0.5 V to V_{CC}
Input clamp current, I_{IK} .... −30 mA
Current into any output in the low state .... 24 mA
Operating free-air temperature range: SN54BCT2827C .... −55°C to 125°C
                                                            SN74BCT2827C .... 0°C to 70°C
Storage temperature range .... −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.
NOTE 1:   The input negative-voltage rating may be exceeded if the input clamp current rating is observed.

recommended operating conditions

		SN54BCT2827C			SN74BCT2827C			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{IK}	Input clamp current			−18			−18	mA
I_{OH}	High-level output current			−1			−1	mA
I_{OL}	Low-level output current			12			12	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN54BCT2827C			SN74BCT2827C			UNIT
			MIN	TYP[‡]	MAX	MIN	TYP[‡]	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −1 mA	V_{CC}−2			V_{CC}−2			V
V_{OL}	V_{CC} = 4.5 V	I_{OL} = 1 mA		0.15	0.5		0.15	0.5	V
		I_{OL} = 12 mA		0.35	0.8		0.35	0.8	
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			20			20	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.5 V			−20			−20	µA
$I_{OL(sink)}$	V_{CC} = 4.5 V,	V_O = 2 V	50			50			mA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.5 V			−0.2			−0.2	mA
I_O[§]	V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CCL}	V_{CC} = 5.5 V,	Outputs open		28	40		28	40	mA
I_{CCZ}	V_{CC} = 5.5 V,	Outputs open		3.8	6		3.8	6	mA
C_i	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		5			5		pF
C_o	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		8			8		pF

[‡] All typical values are at V_{CC} = 5 V, T_A = 25°C.
[§] The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.

switching characteristics (see Note 2)

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
			′BCT2827C			SN54BCT2827C		SN74BCT2827C		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	0.9	3.6	5.2	0.9	6.6	0.9	6	ns
t_{PHL}			2	5.1	7.2	2	8.2	2	7.8	
t_{PZH}	$\overline{OE}$	Y	2.8	5.6	8	2.8	10.7	2.8	10.7	ns
t_{PZL}			5	8.9	11	5	13.7	5	12.9	
t_{PHZ}	$\overline{OE}$	Y	3.2	6.7	8.5	3.2	14	3.2	13	ns
t_{PLZ}			2.7	5.3	10.5	2.7	11	2.7	10	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
NOTE 2:   Load circuits and voltage waveforms are shown in Section 1.

PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
SN74BCT2827CDW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CDWE4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CDWG4	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CDWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CDWRE4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CDWRG4	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74BCT2827CNT	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74BCT2827CNTE4	ACTIVE	PDIP	NT	24	15	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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![Texas Instruments logo] **PACKAGE MATERIALS INFORMATION**

TAPE AND REEL INFORMATION

REEL DIMENSIONS
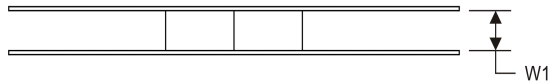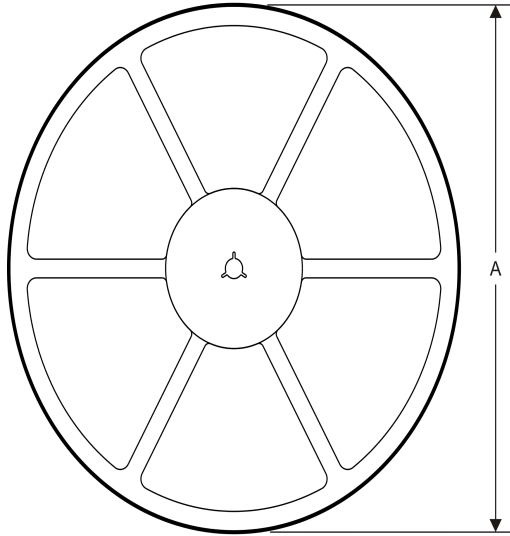
TAPE DIMENSIONS

A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74BCT2827CDWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74BCT2827CDWR	SOIC	DW	24	2000	367.0	367.0	45.0

NT (R−PDIP−T**)   PLASTIC DUAL−IN−LINE PACKAGE
24 PINS SHOWN

PINS ** DIM	24	28
A MAX	1.260 (32,04)	1.425 (36,20)
A MIN	1.230 (31,24)	1.385 (35,18)
B MAX	0.310 (7,87)	0.315 (8,00)
B MIN	0.290 (7,37)	0.295 (7,49)

A

24   13

0.280 (7,11)
0.250 (6,35)

1   12

0.070 (1,78) MAX

0.020 (0,51) MIN

B

0.200 (5,08) MAX

Seating Plane

0.125 (3,18) MIN

0.100 (2,54)

0.021 (0,53)
0.015 (0,38)   ⊕ 0.010 (0,25) Ⓜ

0°−15°

0.010 (0,25) NOM

24 Pin − Full Lead
28 Pin − Vendor option ⚠C

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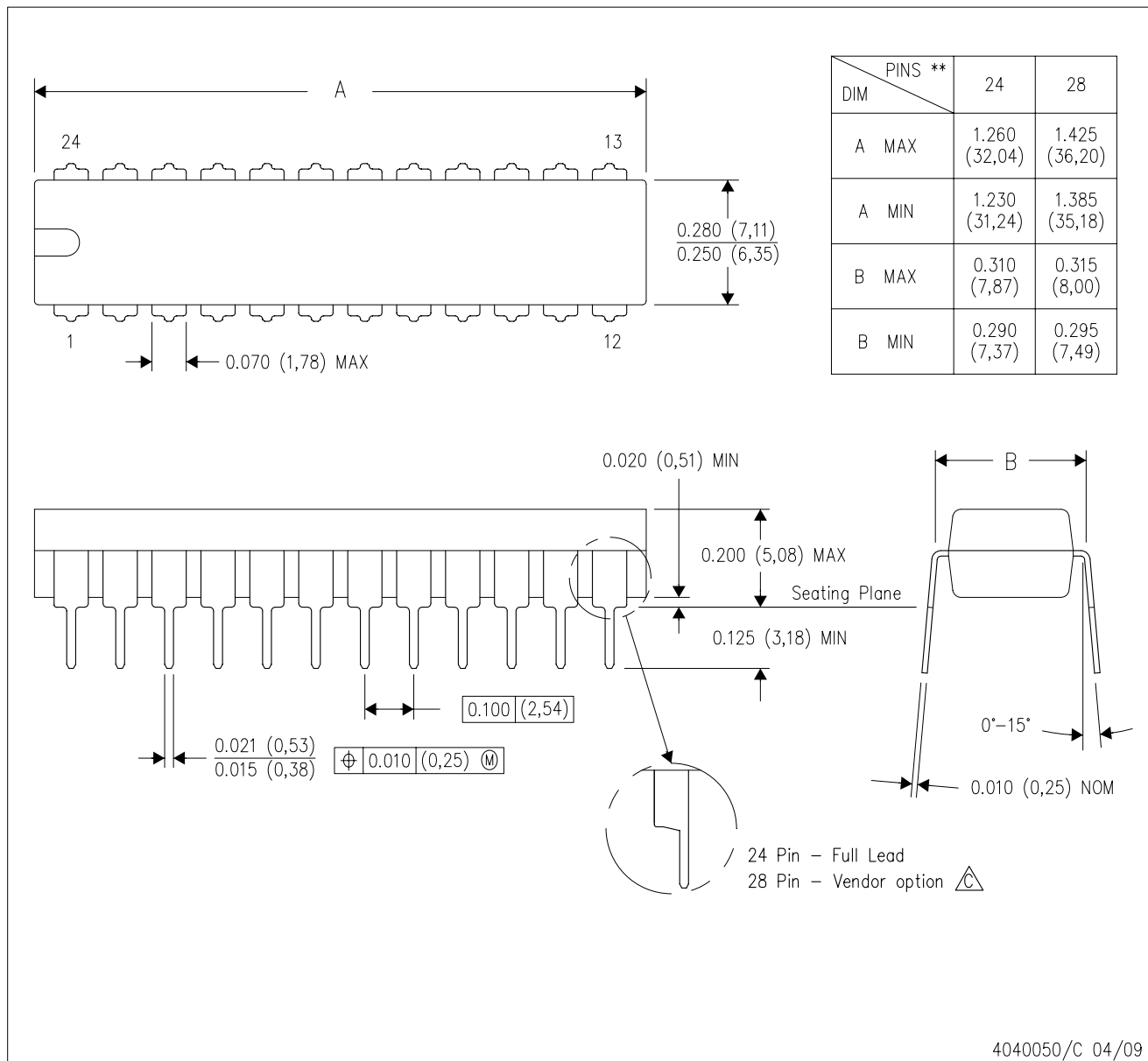
NOTES: A.   All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M−1994.
          B.   This drawing is subject to change without notice.
          ⚠C   The 28 pin end lead shoulder width is a vendor option, either half or full width.

DW (R−PDSO−G24)   PLASTIC SMALL OUTLINE

0.614 (15,60)
0.598 (15,20)

24   13

0.419 (10,63)
0.393 (9,97)

0.299 (7,60)
0.291 (7,40)

1   12

Pin 1
Index Area

0.050 (1,27)

0.020 (0,51)
0.012 (0,31)

⊕ 0.010 (0,25) Ⓜ

0.104 (2,65) Max

0.012 (0,30)
0.004 (0,10)

0.013 (0,33)
0.008 (0,20)

0.004 (0,10)

Gauge Plane

Seating Plane

0.010 (0,25)

0°–8°

0.050 (1,27)
0.016 (0,40)

4040000−5/G 01/11

NOTES: A.   All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M−1994.
          B.   This drawing is subject to change without notice.
          C.   Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
          D.   Falls within JEDEC MS−013 variation AD.

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