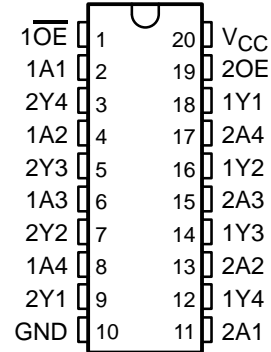


# SN74BCT2241 OCTAL BUFFER AND LINE/MOS DRIVER WITH 3-STATE OUTPUTS

SCBS035C – SEPTEMBER 1988 – REVISED NOVEMBER 1993

- State-of-the-Art BiCMOS Design Significantly Reduces  $I_{CCZ}$
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015
- Output Ports Have Equivalent 33- $\Omega$  Series Resistors, So No External Resistors Are Required
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic 300-mil DIPs (N)

DW OR N PACKAGE  
(TOP VIEW)



## description

These octal buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. Taken together with the 'BCT2240 and 'BCT2244, these devices provide the choice of selected combinations of inverting and noninverting outputs, symmetrical active-low output-enable ( $\overline{OE}$ ) inputs, and complementary OE and  $\overline{OE}$  inputs. These devices feature high fan-out and improved fan-in.

The outputs, which are designed to source or sink up to 12 mA, include 33- $\Omega$  series resistors to reduce overshoot and undershoot.

The SN74BCT2241 is characterized for operation from 0°C to 70°C.

FUNCTION TABLES

INPUTS		OUTPUT
$\overline{1OE}$	1A	1Y
L	H	H
L	L	L
H	X	Z

INPUTS		OUTPUT
2OE	2A	2Y
H	H	H
H	L	L
L	X	Z

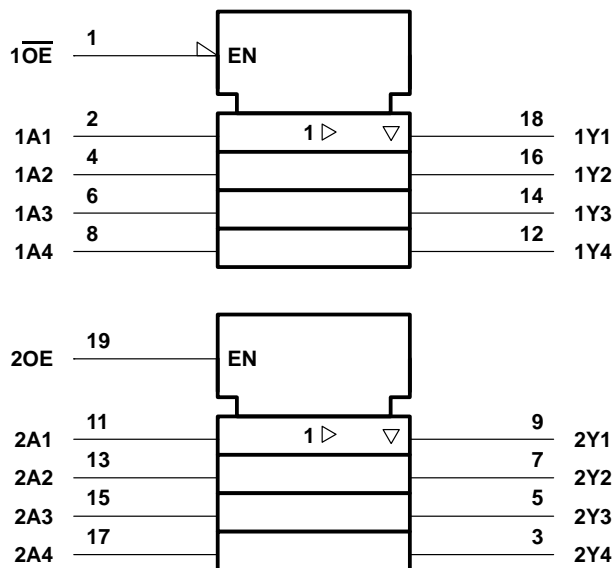
# SN74BCT2241

## OCTAL BUFFER AND LINE/MOS DRIVER

### WITH 3-STATE OUTPUTS

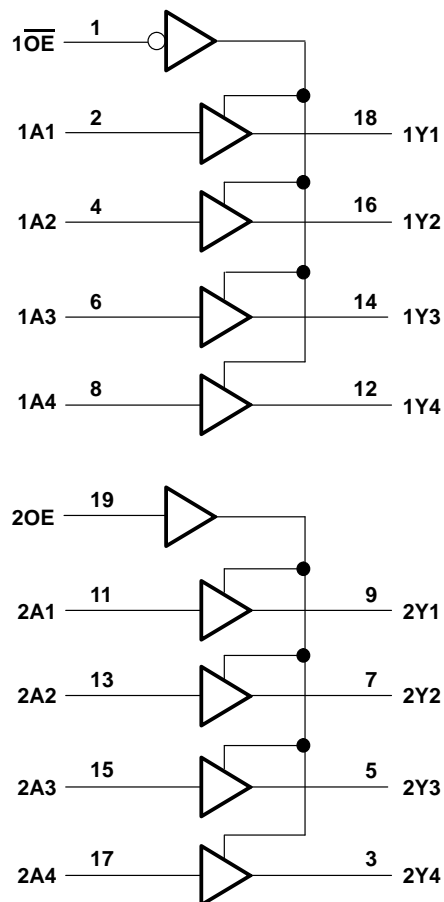
SCBS035C – SEPTEMBER 1988 – REVISED NOVEMBER 1993

#### logic symbol†

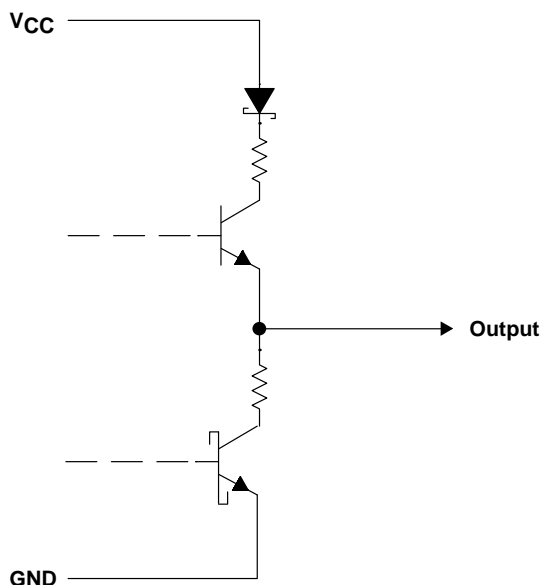


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### logic diagram (positive logic)



#### schematic of Y outputs



# SN74BCT2241

## OCTAL BUFFER AND LINE/MOS DRIVER

### WITH 3-STATE OUTPUTS

SCBS035C – SEPTEMBER 1988 – REVISED NOVEMBER 1993

#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

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, $I_O$	24 mA
Operating free-air temperature range	0°C to 70°C
Storage temperature range	–65°C to 150°C

<sup>†</sup> 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

		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
$I_{IK}$	Input clamp current			–18	mA
$I_{OH}$	High-level output current			–12	mA
$I_{OL}$	Low-level output current			12	mA
$T_A$	Operating free-air temperature	0		70	°C



# SN74BCT2241

## OCTAL BUFFER AND LINE/MOS DRIVER

### WITH 3-STATE OUTPUTS

SCBS035C – SEPTEMBER 1988 – REVISED NOVEMBER 1993

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

PARAMETER	TEST CONDITIONS		MIN	TYP†	MAX	UNIT
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ ,	$I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -1\text{ mA}$	2.4	3.3		V
		$I_{OH} = -12\text{ mA}$	2			
	$V_{CC} = 4.75\text{ V}$ ,	$I_{OH} = -3\text{ mA}$	2.7			
$V_{OL}$	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 1\text{ mA}$		0.15	0.5	V
		$I_{OL} = 12\text{ mA}$		0.42	0.8	
$I_I$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 7\text{ V}$			0.1	mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 2.7\text{ V}$			20	$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 0.5\text{ V}$			-1	mA
$I_{OZH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 2.7\text{ V}$			50	$\mu\text{A}$
$I_{OZL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0.5\text{ V}$			-50	$\mu\text{A}$
$I_{OS}^\ddagger$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0$	-100		-225	mA
$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ ,	Outputs open		23	37	mA
$I_{CCL}$	$V_{CC} = 5.5\text{ V}$ ,	Outputs open		48	76	mA
$I_{CCZ}$	$V_{CC} = 5.5\text{ V}$ ,	Outputs open		6	9	mA
$C_i$	$V_{CC} = 5\text{ V}$ ,	$V_I = 2.5\text{ V}$ or $0.5\text{ V}$		6		pF
$C_o$	$V_{CC} = 5\text{ V}$ ,	$V_O = 2.5\text{ V}$ or $0.5\text{ V}$		11		pF

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

**switching characteristics over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$t_{PLH}$	A	Y	1.1	3	4.4	1.1	4.9	ns
$t_{PHL}$			2.9	4.9	6.6	2.9	6.9	
$t_{PZH}$	OE or $\overline{\text{OE}}$	Y	2.7	6	7.8	2.7	8.9	ns
$t_{PZL}$			4.1	7.7	9.4	4.1	10.3	
$t_{PHZ}$	OE or $\overline{\text{OE}}$	Y	2.5	5.2	7.2	2.5	8.7	ns
$t_{PLZ}$			3.2	7.1	9.5	3.2	11.3	

NOTE 2: Load circuit and voltage waveforms are shown in Section 1.



## **IMPORTANT NOTICE**

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Certain applications using semiconductor products may involve potential risks of death, personal injury, or severe property or environmental damage ("Critical Applications").

**TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.**

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.