

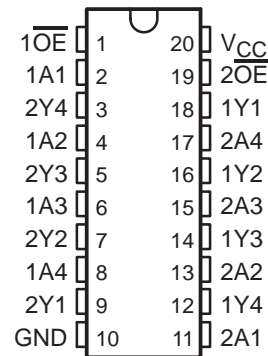
SN64BCT2240

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

SCBS091A – JUNE 1990 – REVISED NOVEMBER 1993

- State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model ($C = 200$ pF, $R = 0$)
- Output Ports Have Equivalent 33- Ω Series Resistors, So No External Resistors Are Required
- High-Impedance State During Power Up and Power Down
- 3-State Buffer-Type Outputs Drive Bus Lines Directly
- Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic 300-mil DIPs (N)

DW OR N PACKAGE
(TOP VIEW)



description

The SN64BCT2240 is an inverting octal buffer and line/MOS driver 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 SN64BCT2241 and SN64BCT2244, these devices provide the choice of selected combinations of inverting outputs, symmetrical \overline{OE} (active-low output-enable) inputs, and complementary OE and \overline{OE} inputs. These devices feature high fan-out and improved fan-in.

When the output-enable ($1\overline{OE}$ and $2\overline{OE}$) inputs are low, the Y outputs reflect the inverse of the data present at the A inputs. When $1\overline{OE}$ and $2\overline{OE}$ are high, the outputs are in the high-impedance state. Output-enable $1\overline{OE}$ affects only the 1Y outputs; output-enable $2\overline{OE}$ affects only the 2Y outputs.

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

The SN64BCT2240 is characterized for operation from -40°C to 85°C and 0°C to 70°C .

FUNCTION TABLE
(each buffer)

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

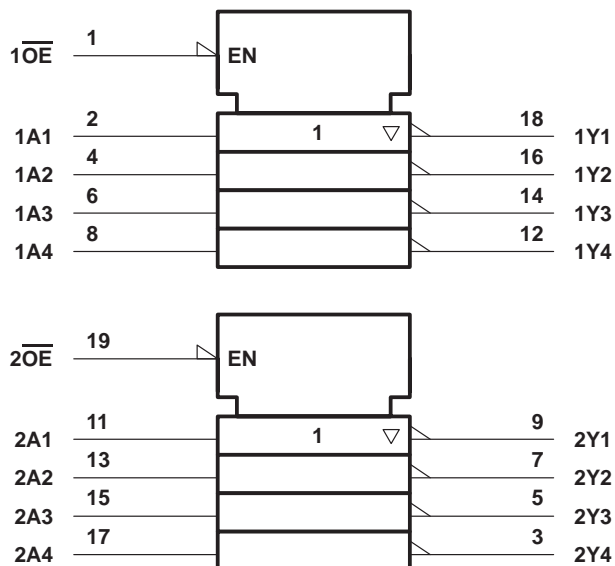
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OCTAL BUFFER AND LINE/MOS DRIVER

WITH 3-STATE OUTPUTS

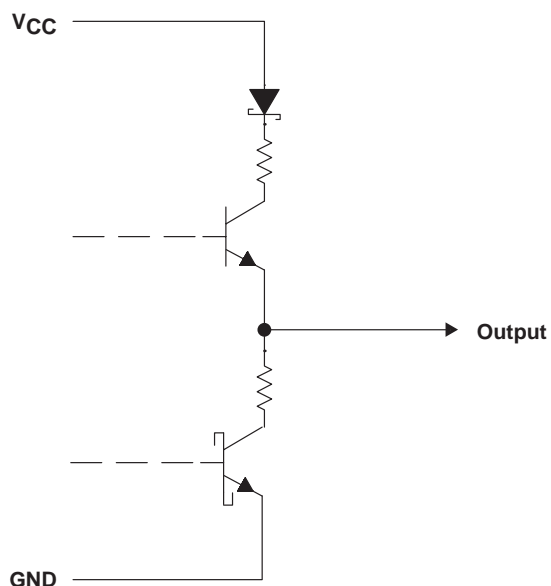
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logic symbol†

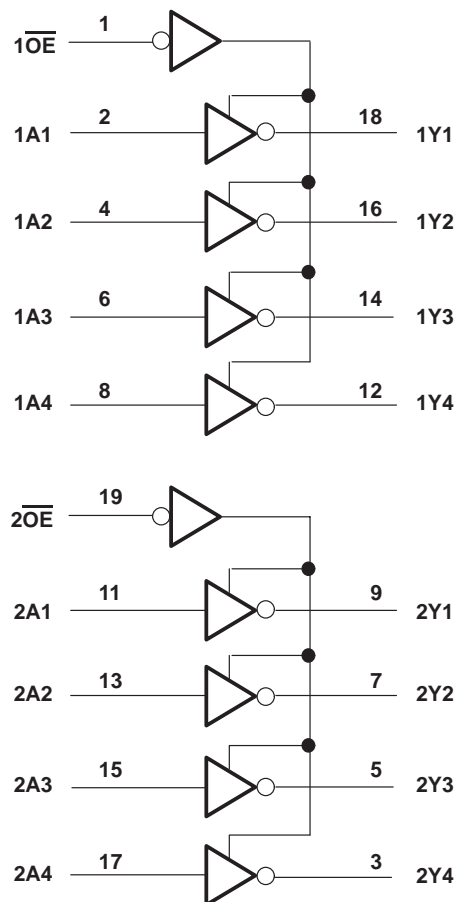


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

schematic of Y outputs



logic diagram (positive logic)



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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} ($V_I < 0$)	–30 mA
Current into any output in the low state, I_O	60 mA
Operating free-air temperature range	–40°C to 85°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 and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions (see Note 2)

	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
$\Delta t/\Delta V_{CC}$ Power-up ramp rate	2			$\mu s/V$
T_A Operating free-air temperature	–40		85	°C

NOTE 2: Unused or floating inputs must be held high or low.

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

PARAMETER	TEST CONDITIONS		MIN	TYP [‡]	MAX	UNIT
V_{IK}	$V_{CC} = 4.5 V$,	$I_I = -18 mA$			–1.2	V
V_{OH}	$V_{CC} = 4.5 V$	$I_{OH} = -1 mA$	2.4	3.3		V
		$I_{OH} = -12 mA$	2	3.1		
V_{OL}	$V_{CC} = 4.5 V$	$I_{OL} = 1 mA$		0.15	0.5	V
		$I_{OL} = 12 mA$		0.15	0.8	
I_I	$V_{CC} = 5.5 V$,	$V_I = 7 V$			0.1	mA
I_{IH}	$V_{CC} = 5.5 V$,	$V_I = 2.7 V$			20	μA
I_{IL}	$V_{CC} = 5.5 V$,	$V_I = 0.5 V$			–1	mA
I_{OZ}	$V_{CC} = 0$ to 2.3 V (power up)	$V_O = 2.7 V$ or 0.5 V, $\overline{OE} = 0.8 V$			± 50	μA
	$V_{CC} = 1.8 V$ to 0 (power down)				± 50	
I_{OZH}	$V_{CC} = 5.5 V$,	$V_O = 2.7 V$			50	μA
I_{OZL}	$V_{CC} = 5.5 V$,	$V_O = 0.5 V$			–50	μA
I_{OS}^{\S}	$V_{CC} = 5.5 V$,	$V_O = 0$	–100		–225	mA
I_{CCL}	$V_{CC} = 5.5 V$,	Outputs open		46	76	mA
I_{CCH}	$V_{CC} = 5.5 V$,	Outputs open		19	32	mA
I_{CCZ}	$V_{CC} = 5.5 V$,	Outputs open		6	8	mA
C_i	$V_{CC} = 5 V$,	$V_I = V_{CC}$ or GND		6		pF
C_o	$V_{CC} = 5 V$,	$V_O = V_{CC}$ or GND		11		pF

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

^{\S} Not more than one output should be tested at a time, and the duration of the test should not exceed one second.



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WITH 3-STATE OUTPUTS

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switching characteristics over recommended range of supply voltage, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$			$T_A = -40^\circ\text{C}$ to 85°C		$T_A = 0^\circ\text{C}$ to 70°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	0.5	3.4	4.8	0.5	6.3	0.5	5.7	ns
t_{PHL}			0.5	2.8	4	0.5	4.6	0.5	4.4	
t_{PZH}	\overline{OE}	Y	2.6	6.2	8.2	2.6	10.1	2.6	9.3	ns
t_{PZL}			4.3	8.8	10.9	4.3	12.9	4.3	12.4	
t_{PHZ}	\overline{OE}	Y	2	5.3	7.1	2	9.2	2	8.7	ns
t_{PLZ}			2.2	6.7	8.5	2.2	12.2	2.2	10.6	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN64BCT2240DW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI
SN64BCT2240N	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI

⁽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) 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.

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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