- *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°C
- Typical V_{OHV} (Output V_{OH} Undershoot) > 2 V at V_{CC} = 3.3 V, T_A = 25°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

DB, DW, OR PW PACKAGE
(TOP VIEW)

$1\overline{OE}$	1	20	V_{CC}
1A1	2	19	$2\overline{OE}$
2Y4	3	18	1Y1
1A2	4	17	2A4
2Y3	5	16	1Y2
1A3	6	15	2A3
2Y2	7	14	1Y3
1A4	8	13	2A2
2Y1	9	12	1Y4
GND	10	11	2A1
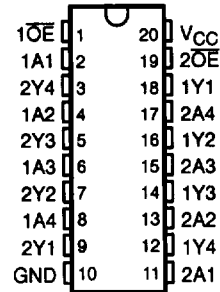
description

This octal buffer/driver is designed for 2.7-V to 3.6-V V_{CC} operation.

The SN74LVC240 is designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters.

The SN74LVC240 is organized as two 4-bit buffers/drivers with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the device passes data from the A inputs to the Y outputs. When $\overline{OE}$ is high, the outputs are in the high-impedance state.

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 SN74LVC240 is characterized for operation from −40°C to 85°C.

FUNCTION TABLE
(each buffer)

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

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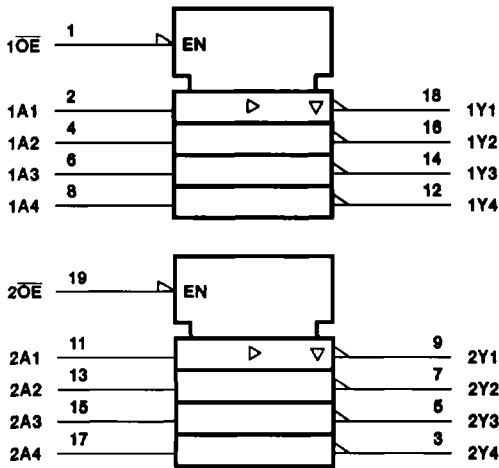POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

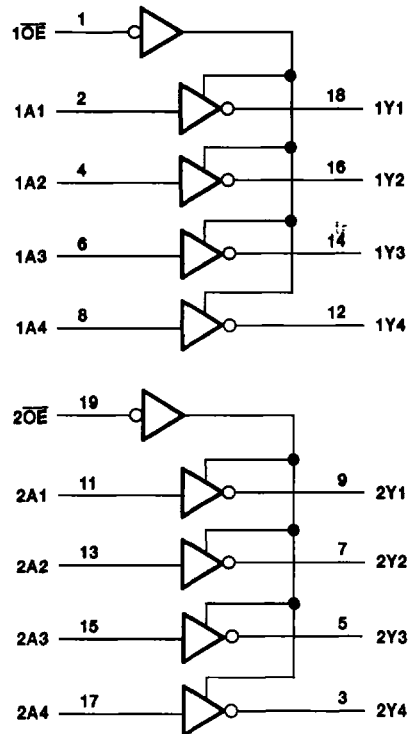# SN74LVC240
OCTAL BUFFER/DRIVER
WITH 3-STATE OUTPUTS

SCAS293A – JANUARY 1993 – REVISED JULY 1995

logic symbol†

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

logic diagram (positive logic)

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 $T_A = 55°C$ (in still air) (see Note 3): DB package .... 0.6 W
DW package .... 1.6 W
PW package .... 0.7 W
Operating free-air temperature range, T_A .... −40°C to 85°C
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.

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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 V to 3.6 V	2		V
V_{IL}	Low-level input voltage	V_{CC} = 2.7 V to 3.6 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 V		−12	mA
		V_{CC} = 3 V		−24	
I_{OL}	Low-level output current	V_{CC} = 2.7 V		12	mA
		V_{CC} = 3 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}†	MIN	TYP‡	MAX	UNIT
V_{OH}	I_{OH} = −100 μA		MIN to MAX	V_{CC}−0.2			V
	I_{OH} = −12 mA		2.7 V	2.2			
			3 V	2.4			
	I_{OH} = −24 mA		3 V	2			
V_{OL}	I_{OL} = 100 μA		MIN to MAX			0.2	V
	I_{OL} = 12 mA		2.7 V			0.4	
	I_{OL} = 24 mA		3 V			0.55	
I_I	V_I = 5.5 V or GND		3.6 V			±5	μA
I_{OZ}	V_O = V_{CC} or GND		3.6 V			±10	μA
I_{CC}	V_I = V_{CC} or GND,	I_O = 0	3.6 V			20	μA
ΔI_{CC}	One input at V_{CC} − 0.6 V,	Other inputs at V_{CC} or GND	3 V to 3.6 V			500	μA
C_i	V_I = V_{CC} or GND		3.3 V		5.5		pF
C_o	V_O = V_{CC} or GND		3.3 V		5.8		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 V, T_A = 25°C.

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 3.3 V ± 0.3 V		V_{CC} = 2.7 V		UNIT
			MIN	MAX	MIN	MAX	
t_{pd}	A	Y	1.5	7.5		8.5	ns
t_{en}	$\overline{OE}$	Y	1.5	8		9	ns
t_{dis}	$\overline{OE}$	Y	1.5	7.5		8.5	ns

operating characteristics, V_{CC} = 3.3 V, T_A = 25°C

PARAMETER			TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per buffer/driver	Outputs enabled	C_L = 50 pF, f = 10 MHz	24	pF
		Outputs disabled		2.5	

PARAMETER MEASUREMENT INFORMATION

TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	6 V
t_{PHZ}/t_{PZH}	GND
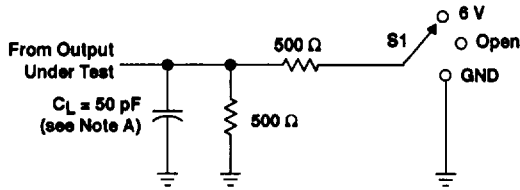
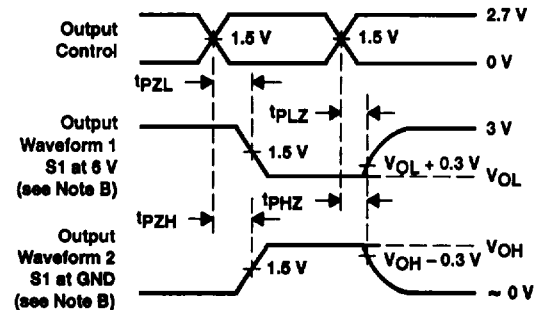**LOAD CIRCUIT FOR OUTPUTS**
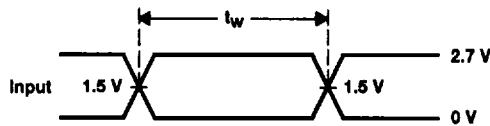
VOLTAGE WAVEFORMS
PULSE DURATION
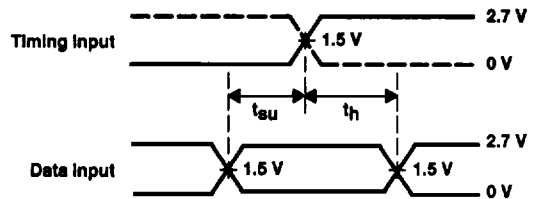
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES
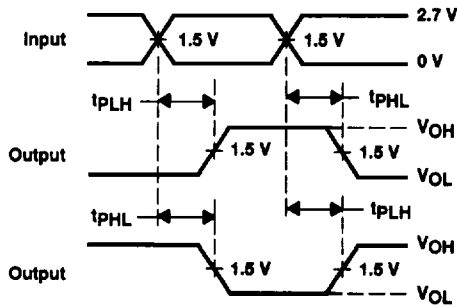
VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

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

NOTES: 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.
D. The outputs are measured one at a time with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.

Figure 1. Load Circuit and Voltage Waveforms

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