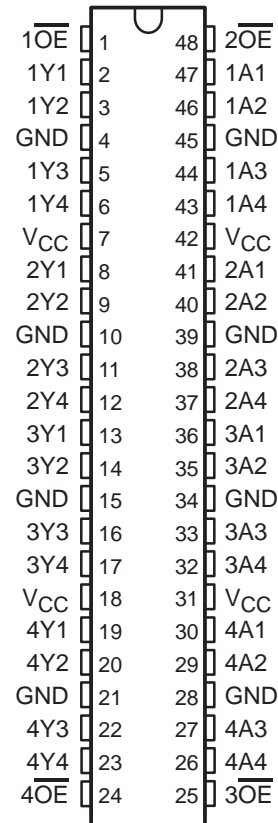


SN54ACT16240, 74ACT16240 16-BIT BUFFERS/DRIVERS WITH 3-STATE OUTPUTS

SCAS137C – JULY 1989 – REVISED NOVEMBER 1996

- **Members of the Texas Instruments Widebus™ Family**
- **Inputs Are TTL-Voltage Compatible**
- **3-State Outputs Drive Bus Lines or Buffer Memory Address Registers**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- **EPIC™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**
- **Package Options Include Plastic 300-mil Shrink Small-Outline (DL) Packages Using 25-mil Center-to-Center Pin Spacings and 380-mil Fine-Pitch Ceramic Flat (WD) Packages Using 25-mil Center-to-Center Spacings**

SN54ACT16240 . . . WD PACKAGE
74ACT16240 . . . DL PACKAGE
(TOP VIEW)



description

The SN54ACT16240 and 74ACT16240 are 16-bit buffers or line drivers designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The devices can be used as four 4-bit buffers, two 8-bit buffers, or one 16-bit buffer. These devices provide inverting outputs and symmetrical active-low output-enable (\overline{OE}) inputs.

The 74ACT16240 is packaged in TI's shrink small-outline package, which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN54ACT16240 is characterized for operation over the full military temperature range of -55°C to 125°C . The 74ACT16240 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE
(each section)

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



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 **TEXAS
INSTRUMENTS**

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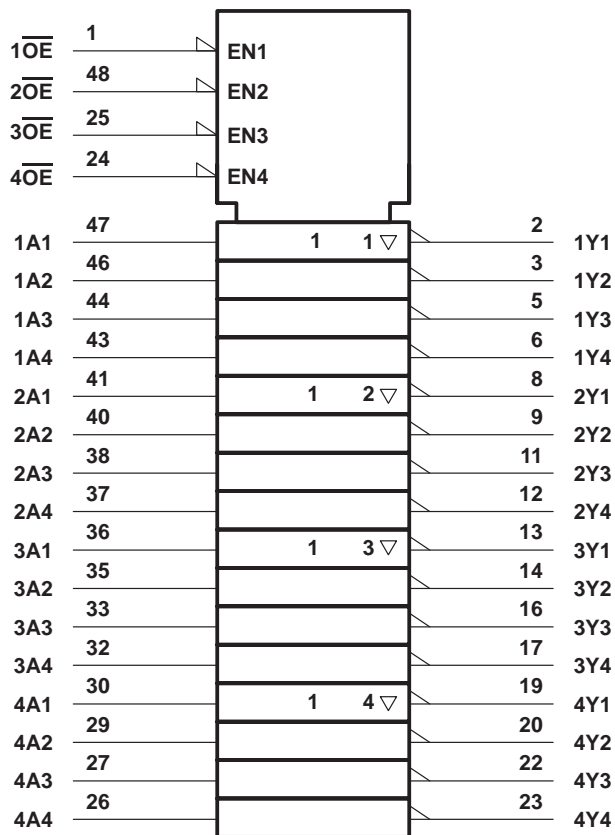
SN54ACT16240, 74ACT16240

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

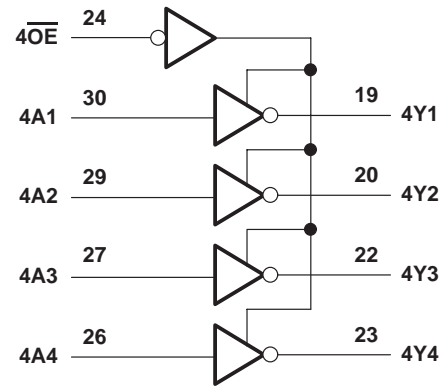
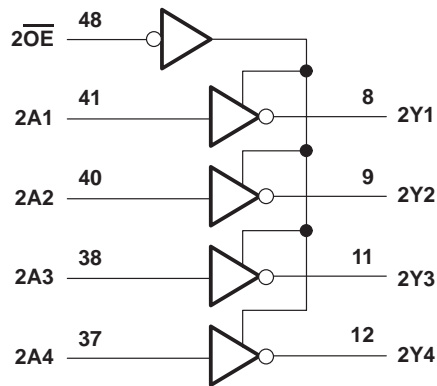
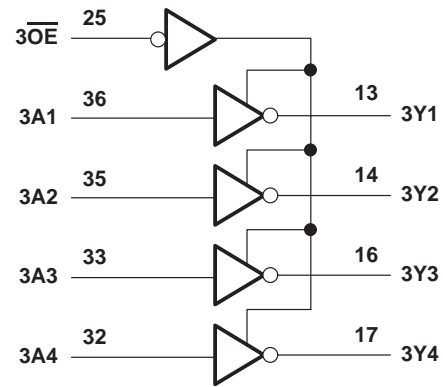
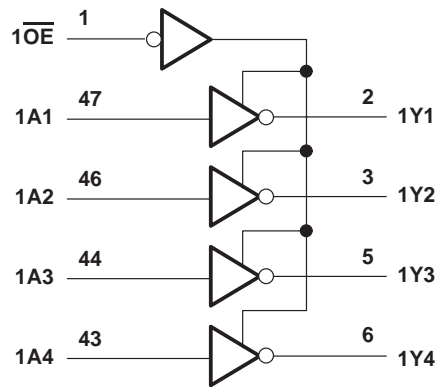
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logic symbol†



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

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 7 V
Input voltage range, V_I (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 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	± 400 mA
Maximum package power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): DL package	1.2 W
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 voltage ratings may be exceeded if the input and output current ratings are observed.
 2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

SN54ACT16240, 74ACT16240

16-BIT BUFFERS/DRIVERS

WITH 3-STATE OUTPUTS

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recommended operating conditions (see Note 3)

		SN54ACT16240			74ACT16240			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
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
I_{OH}	High-level output current			-24			-24	mA
I_{OL}	Low-level output current			24			24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0		10	0		10	ns/V
T_A	Operating free-air temperature	-55		125	-40		85	°C

NOTE 3: 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}	$T_A = 25^\circ\text{C}$			SN54ACT16240		74ACT16240		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$I_{OH} = -50 \mu\text{A}$	4.5 V	4.4		4.4		4.4		V	
		5.5 V	5.4		5.4		5.4			
	$I_{OH} = -24 \text{ mA}$	4.5 V	3.94		3.7		3.8			
		5.5 V	4.94		4.7		4.8			
	$I_{OH} = -50 \text{ mA}^\dagger$	5.5 V			3.85					
$I_{OH} = -75 \text{ mA}^\dagger$	5.5 V					3.85				
V_{OL}	$I_{OL} = 50 \mu\text{A}$	4.5 V		0.1	0.1		0.1		V	
		5.5 V		0.1	0.1		0.1			
	$I_{OL} = 24 \text{ mA}$	4.5 V		0.36	0.5		0.44			
		5.5 V		0.36	0.5		0.44			
	$I_{OL} = 50 \text{ mA}^\dagger$	5.5 V			1.65					
$I_{OL} = 75 \text{ mA}^\dagger$	5.5 V					1.65				
I_I	$V_I = V_{CC}$ or GND	5.5 V		± 0.1	± 1		± 1	μA		
I_{OZ}	$V_O = V_{CC}$ or GND	5.5 V		± 0.5	± 10		± 5	μA		
I_{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V		8	160		80	μA		
ΔI_{CC}^\ddagger	One input at 3.4 V, Other inputs at V_{CC} or GND	5.5 V		0.9	1		1	mA		
C_i	$V_I = V_{CC}$ or GND	5.5 V		4.5				pF		
C_o	$V_O = V_{CC}$ or GND	5 V		12				pF		

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC} .

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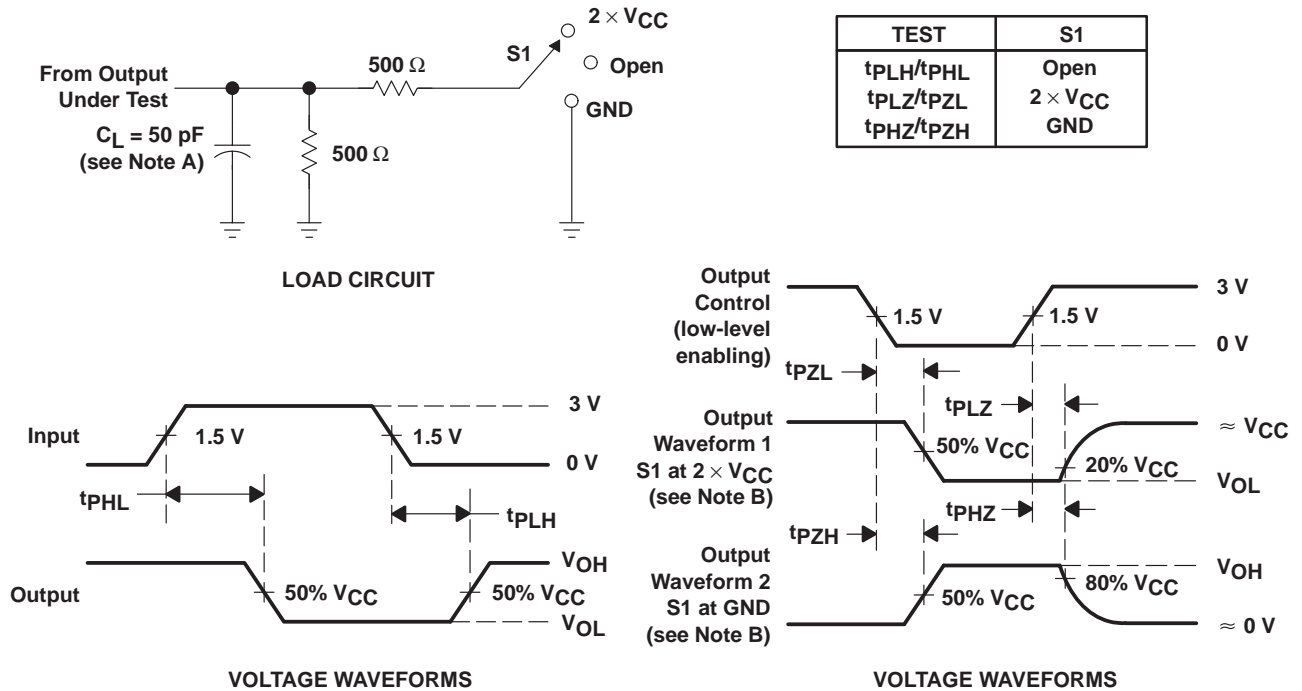
switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$			SN54ACT16240		74ACT16240		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	2.3	5	7.7	2	9.5	2.3	8.5	ns
t_{PHL}			4.1	6.7	9.2	3	11.5	4.1	10.2	
t_{PZH}	$\overline{\text{OE}}$	Y	2.6	5.6	8.5	2	10.1	2.6	9.4	ns
t_{PZL}			3.3	6.7	10.2	2.5	12.2	3.3	11.4	
t_{PHZ}	$\overline{\text{OE}}$	Y	5.9	8.3	11	4.5	12.7	5.9	12	ns
t_{PLZ}			5.1	7.4	9.9	4	12	5.1	10.7	

operating characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per driver	Outputs enabled	38	pF
		Outputs disabled	9	

PARAMETER MEASUREMENT INFORMATION



- 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: $PRR \leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r = 3\text{ ns}$, $t_f = 3\text{ ns}$.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9201801MXA	ACTIVE	CFP	WD	48	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9201801MX A SNJ54ACT16240W D	Samples
74ACT16240DL	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT16240	Samples
74ACT16240DLG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT16240	Samples
74ACT16240DLR	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT16240	Samples
SNJ54ACT16240WD	ACTIVE	CFP	WD	48	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9201801MX A SNJ54ACT16240W D	Samples

(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.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

⁽⁵⁾ Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

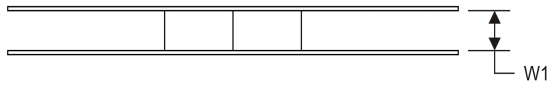
⁽⁶⁾ Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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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
74ACT16240DLR	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74ACT16240DLR	SSOP	DL	48	1000	367.0	367.0	55.0

WD (R-GDFP-F**)

CERAMIC DUAL FLATPACK

48 LEADS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. This package can be hermetically sealed with a ceramic lid using glass frit.
 D. Index point is provided on cap for terminal identification only
 E. Falls within MIL STD 1835: GDFP1-F48 and JEDEC MO-146AA
 GDFP1-F56 and JEDEC MO-146AB

MECHANICAL DATA

DL (R-PDSO-G48)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MO-118

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