

# MC74AC540, MC74ACT540, MC74AC541, MC74ACT541



ON Semiconductor®

## Octal Buffer/Line Driver with 3-State Outputs

The MC74AC540/74ACT540 and MC74AC541/74ACT541 are octal buffer/line drivers designed to be employed as memory and address drivers, clock drivers and bus oriented transmitter/receivers. The MC74AC541/74ACT541 is a noninverting option of the MC74AC540/74ACT540.

These devices are similar in function to the MC74AC240/74ACT240 and MC74AC244/74ACT244 while providing flow-through architecture (inputs on opposite side from outputs). This pinout arrangement makes these devices especially useful as output ports for microprocessors, allowing ease of layout and greater PC board density.

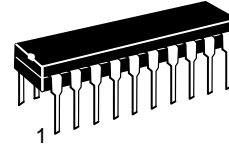
### Features

- 3-State Outputs
- Inputs and Outputs Opposite Side of Package, Allowing Easier Interface to Microprocessors
- Outputs Source/Sink 24 mA
- MC74AC540/74ACT540 Provides Inverted Outputs
- MC74AC541/74ACT541 Provides Noninverted Outputs
- 'ACT540 and 'ACT541 Have TTL Compatible Inputs
- Pb-Free Packages are Available

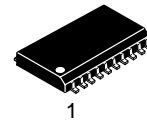
### TRUTH TABLE

Inputs			Outputs	
OE <sub>1</sub>	OE <sub>2</sub>	D	'540	'541
L	L	H	L	H
H	X	X	Z	Z
X	H	X	Z	Z
L	L	L	H	L

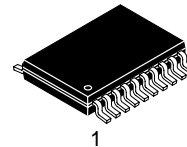
H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance



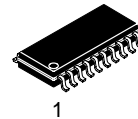
PDIIP-20  
N SUFFIX  
CASE 738



SOIC-20W  
DW SUFFIX  
CASE 751D



TSSOP-20  
DT SUFFIX  
CASE 948E



SOEIAJ-20  
M SUFFIX  
CASE 967

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 9 of this data sheet.

# MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

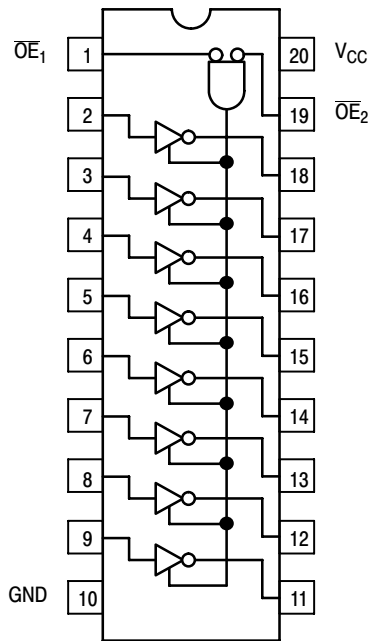


Figure 1. MC74AC540/74ACT540

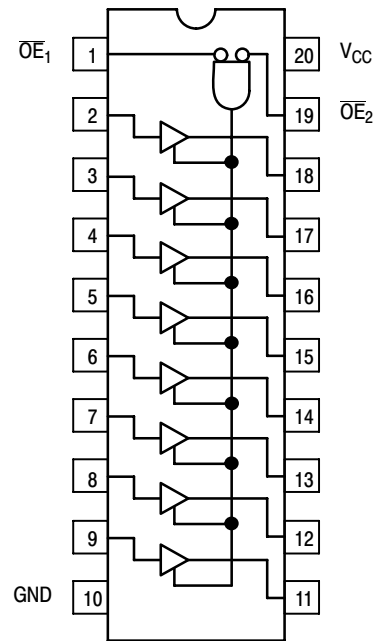


Figure 2. MC74AC541/74ACT541

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{IN}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{OUT}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{IN}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{OUT}$	DC Output Sink/Source Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$T_{stg}$	Storage Temperature	-65 to +150	$^{\circ}C$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
$V_{CC}$	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
$V_{IN}, V_{OUT}$	DC Input Voltage, Output Voltage (Ref. to GND)	0	-	$V_{CC}$	V	
$t_r, t_f$	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	$V_{CC} @ 3.0 V$	-	150	-	ns/V
		$V_{CC} @ 4.5 V$	-	40	-	
		$V_{CC} @ 5.5 V$	-	25	-	
$t_r, t_f$	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	$V_{CC} @ 4.5 V$	-	10	-	ns/V
		$V_{CC} @ 5.5 V$	-	8.0	-	
$T_J$	Junction Temperature (PDIP)	-	-	140	$^{\circ}C$	
$T_A$	Operating Ambient Temperature Range	-40	25	85	$^{\circ}C$	
$I_{OH}$	Output Current - High	-	-	-24	mA	
$I_{OL}$	Output Current - Low	-	-	24	mA	

1.  $V_{IN}$  from 30% to 70%  $V_{CC}$ ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2.  $V_{IN}$  from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5	-	3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> -24 mA -24 mA	
		5.5	-	4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5	-	0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 24 mA I <sub>OL</sub> 24 mA	
		5.5	-	0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CCT</sub>	Additional Max. I <sub>CC</sub> /Input	5.5	0.6	-	1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OZ</sub>	Maximum 3-State Current	5.5	-	±0.5	±5.0	μA	V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub> V <sub>I</sub> = V <sub>CC</sub> , GND V <sub>O</sub> = V <sub>CC</sub> , GND	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5	-	-	75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	-	8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

## AC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay Data to Output ('ACT540)	5.0	1.0	–	7.0	1.0	7.5	ns	3–5
t <sub>PHL</sub>	Propagation Delay Data to Output ('ACT540)	5.0	1.0	–	8.0	1.0	8.5	ns	3–5
t <sub>PZH</sub>	Output Enable Time (‘ACT540)	5.0	1.0	–	10.5	1.0	11.5	ns	3–7
t <sub>PZL</sub>	Output Enable Time (‘ACT540)	5.0	1.0	–	9.5	1.0	10.5	ns	3–8
t <sub>PHZ</sub>	Output Disable Time (‘ACT540)	5.0	1.0	–	12.0	1.0	12.5	ns	3–7
t <sub>PLZ</sub>	Output Disable Time (‘ACT540)	5.0	1.5	–	9.0	1.0	10	ns	3–8
t <sub>PLH</sub>	Propagation Delay Data to Output ('ACT541)	5.0	1.5	–	7.5	1.0	8.0	ns	3–5
t <sub>PHL</sub>	Propagation Delay Data to Output ('ACT541)	5.0	1.5	–	7.5	1.0	8.0	ns	3–5
t <sub>PZH</sub>	Output Enable Time (‘ACT541)	5.0	2.0	–	10.0	1.0	11.0	ns	3–7
t <sub>PZL</sub>	Output Enable Time (‘ACT541)	5.0	1.5	–	9.5	1.0	10.5	ns	3–8
t <sub>PHZ</sub>	Output Disable Time (‘ACT541)	5.0	2.0	–	11.0	1.0	12.0	ns	3–7
t <sub>PLZ</sub>	Output Disable Time (‘ACT541)	5.0	2.0	–	9.0	1.0	10	ns	3–8

\*Voltage Range 5.0 V is 5.0 V ±0.5 V.

## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	30	pF	V <sub>CC</sub> = 5.0 V

## MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

### ORDERING INFORMATION (continued)

Device	Package	Shipping†
MC74AC541DTR2	TSSOP-20*	2500 / Tape & Reel
MC74AC541DTR2G	TSSOP-20*	
MC74ACT541DT	TSSOP-20*	75 Units / Rail
MC74ACT541DTG	TSSOP-20*	
MC74ACT541DTR2	TSSOP-20*	2500 / Tape & Reel
MC74ACT541DTR2G	TSSOP-20*	
MC74AC541M	SOEIAJ-20	40 Units / Rail
MC74AC541MG	SOEIAJ-20 (Pb-Free)	
MC74AC541MEL	SOEIAJ-20	2000 / Tape & Reel
MC74AC541MELG	SOEIAJ-20 (Pb-Free)	
MC74ACT541M	SOEIAJ-20	40 Units / Rail
MC74ACT541MG	SOEIAJ-20 (Pb-Free)	
MC74ACT541MEL	SOEIAJ-20	2000 / Tape & Reel
MC74ACT541MELG	SOEIAJ-20 (Pb-Free)	

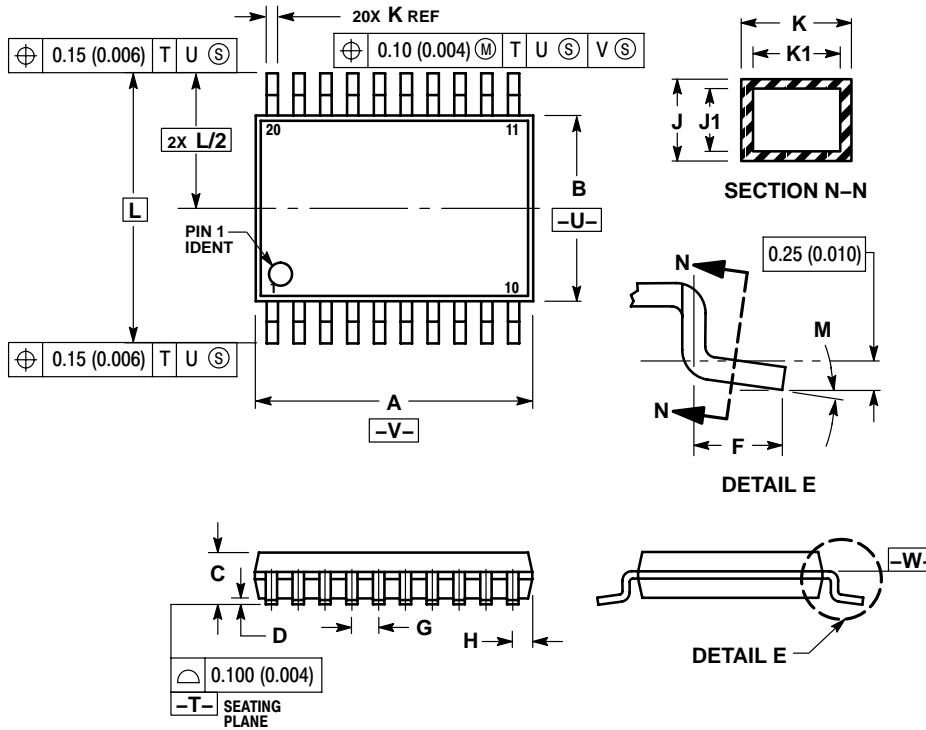
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*These packages are inherently Pb-Free.

# MC74AC540, MC74ACT540, MC74AC541, MC74ACT541

## PACKAGE DIMENSIONS

TSSOP-20  
DT SUFFIX  
CASE 948E-02  
ISSUE C

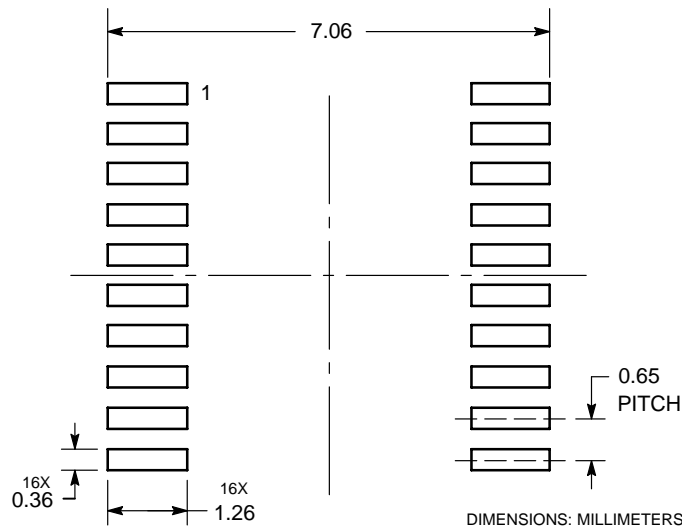


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE  $-W-$ .

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.