



54AC/74AC540 • 54ACT/74ACT540 Octal Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 'AC/'ACT540 is an octal buffer/line drivers designed to be employed as memory and address drivers, clock drivers and bus oriented transmitter/receivers.

These devices are similar in function to the 'AC/'ACT240 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.

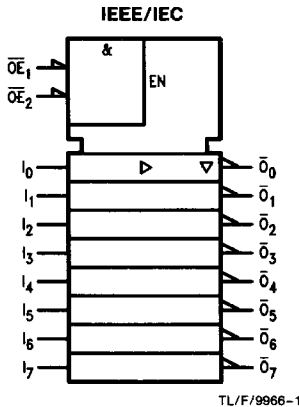
The information for the 'ACT540 is Advanced Information only.

Features

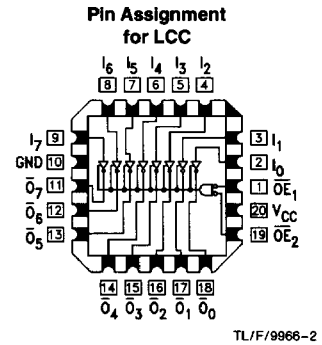
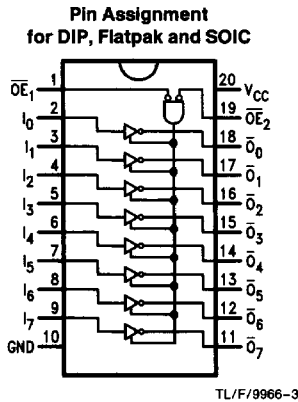
- TRI-STATE inverting outputs
- Inputs and outputs opposite side of package, allowing easier interface to microprocessors
- Output source/sink 24 mA
- 'ACT540 has TTL-compatible inputs

Ordering Code: See Section 5

Logic Symbol



Connection Diagrams



Truth Table

Inputs			Outputs
\overline{OE}_1	\overline{OE}_2	I	
L	L	H	L
H	X	X	Z
X	H	X	Z
L	L	L	H

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

Absolute Maximum Rating (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	± 50 mA
Storage Temperature (T_{STG})	-65°C to +150°C

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

Recommended Operating Conditions

Supply Voltage (V_{CC})		2.0V to 6.0V
'AC		4.5V to 5.5V
'ACT		
Input Voltage (V_I)		0V to V_{CC}
Output Voltage (V_O)		0V to V_{CC}
Operating Temperature (T_A)		
74AC/ACT		-40°C to +85°C
54AC/ACT		-55°C to +125°C
Junction Temperature (T_J)		
CDIP		175°C
PDIP		140°C
Input Rise and Fall Time (t_r, t_f)		
(Note 2) (Typical)		
(Except Schmitt Inputs) 'AC Devices		
V_{IN} from 30% to 70% of V_{CC}		
V_{CC} @ 3.0V		150 ns/V
V_{CC} @ 4.5V		40 ns/V
V_{CC} @ 5.5V		25 ns/V
Input Rise and Fall Time (t_r, t_f)		
(Note 2) (Typical)		
(Except Schmitt Inputs) 'ACT Devices		
V_{IN} from 0.8V to 2.0V, V_{meas} from 0.8V to 2.0V		
V_{CC} @ 4.5V		10 ns/V
V_{CC} @ 5.5V		8 ns/V

Note 2: See individual datasheets for those devices which differ from the typical input rise and fall times noted here.

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V_{CC} (V)	74AC		54AC		74AC		Units	Conditions
			$T_A = +25^\circ\text{C}$		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			
			Typ	Guaranteed Limits						
V_{IH}	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	2.1	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	3.15	3.15	3.15	3.15			
		5.5	2.75	3.85	3.85	3.85	3.85			
V_{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	0.9	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	1.35	1.35	1.35	1.35			
		5.5	2.75	1.65	1.65	1.65	1.65			
V_{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	2.9	2.9	V	$I_{OUT} = -50 \mu\text{A}$	
		4.5	4.49	4.4	4.4	4.4	4.4			
		5.5	5.49	5.4	5.4	5.4	5.4			
			3.0		2.56	2.4	2.46	V	* $V_{IN} = V_{IL}$ or V_{IH} -12 mA I_{OH} -24 mA -24 mA	
			4.5		3.86	3.7	3.76			
			5.5		4.86	4.7	4.76			
			5.5		4.86	4.7	4.76			
V_{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	0.1	V	$I_{OUT} = 50 \mu\text{A}$		
		4.5	0.001	0.1	0.1	0.1				
		5.5	0.001	0.1	0.1	0.1				
			3.0		0.36	0.50	0.44	V	* $V_{IN} = V_{IL}$ or V_{IH} 12 mA I_{OL} 24 mA 24 mA	
			4.5		0.36	0.50	0.44			
			5.5		0.36	0.50	0.44			
			5.5		0.36	0.50	0.44			
I_{IN}	Maximum Input Leakage Current	5.5		± 0.1	± 1.0	± 1.0	μA	$V_I = V_{CC}, \text{GND}$		

DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V _{CC} (V)	74AC		54AC		74AC		Units	Conditions
			T _A = +25°C		T _A = -55°C to +125°C		T _A = -40°C to +85°C			
			Typ	Guaranteed Limits						
I _{OZ}	Maximum TRI-STATE® Current	5.5		±0.5		±10.0		±5.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	†Minimum Dynamic Output Current	5.5				50		75	mA	V _{OLD} = 1.65V Max
I _{OHD}	Output Current	5.5				-50		-75	mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5		8.0		160.0		80.0	μA	V _{IN} = V _{CC} 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.

Note: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.
I_{CC} for 54AC @ 25°C is identical to 74AC @ 25°C.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} * (V)	74AC			54AC		74AC		Units	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -55°C to +125°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max	Min	Max		
t _{PLH}	Propagation Delay Data to Output	3.3	1.5	5.5	7.5	1.0	9.0	1.0	8.0	ns	2-5
		5.0	1.5	4.0	6.0	1.0	7.0	1.0	6.5		
t _{PHL}	Propagation Delay Data to Output	3.3	1.5	5.0	7.0	1.0	8.0	1.0	7.5	ns	2-5
		5.0	1.5	4.0	5.5	1.0	6.5	1.0	6.0		
t _{PZH}	Output Enable Time	3.3	3.0	8.5	11.0	1.0	13.0	2.5	12.0	ns	2-7
		5.0	2.0	6.5	8.5	1.0	10.0	2.0	9.5		
t _{PZL}	Output Enable Time	3.3	2.5	7.5	10.0	1.0	12.0	2.0	11.0	ns	2-8
		5.0	2.0	6.0	7.5	1.0	9.0	1.5	8.5		
t _{PHZ}	Output Disable Time	3.3	2.5	8.5	13.0	1.0	15.5	1.5	14.0	ns	2-7
		5.0	1.5	7.5	10.5	1.0	12.0	1.0	11.0		
t _{PLZ}	Output Disable Time	3.3	2.5	7.0	10.0	1.0	12.0	2.0	11.0	ns	2-8
		5.0	1.5	6.0	8.0	1.0	10.0	1.5	9.0		

*Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

Symbol	Parameter	AC/ACT	Units	Conditions
		Typ		
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0V
C _{PD}	Power Dissipation Capacitance	30.0	pF	V _{CC} = 5.0V