

Octal Bus Buffer with TTL Input Level

TC74HCT540A Inverting, 3-State Outputs

TC74HCT541A Non-Inverting, 3-State Outputs

The TC74HCT540A/TC74HCT541A are high speed CMOS OCTAL BUS BUFFERS fabricated with silicon gate C²MOS technology.

These devices can be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

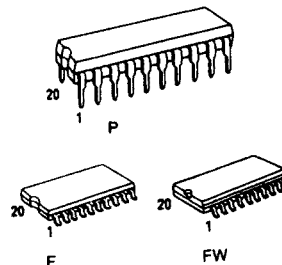
The TC74HCT540A is a non-inverting type, and the TC74HCT541A is an inverting type.

When either $\bar{G}1$ or $\bar{G}2$ are high, the terminal outputs are in the high-impedance state.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Features

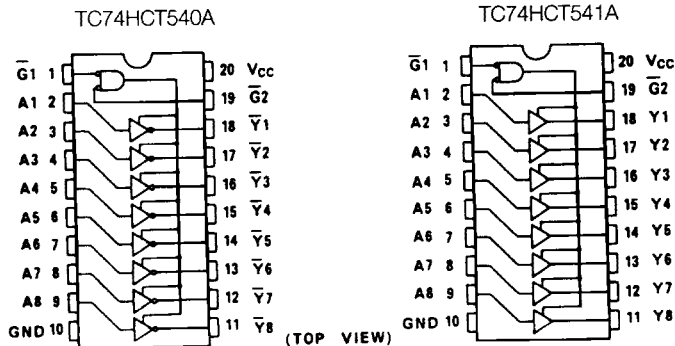
- High Speed: $t_{pd} = 10\text{ns}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation: $I_{CC} = 4\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs: $V_{IL} = 0.8$ (Max.)
 $V_{IH} = 2.0$ (Min.)
- Wide Interfacing Ability: LSTTL, NMOS, CMOS
- Output Drive Capability: 15 LSTTL Loads
- Symmetrical Output Impedance: $I_{OH} = I_{OL} = 6\text{mA}$ (Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Pin and Function Compatible with 74LS540/541



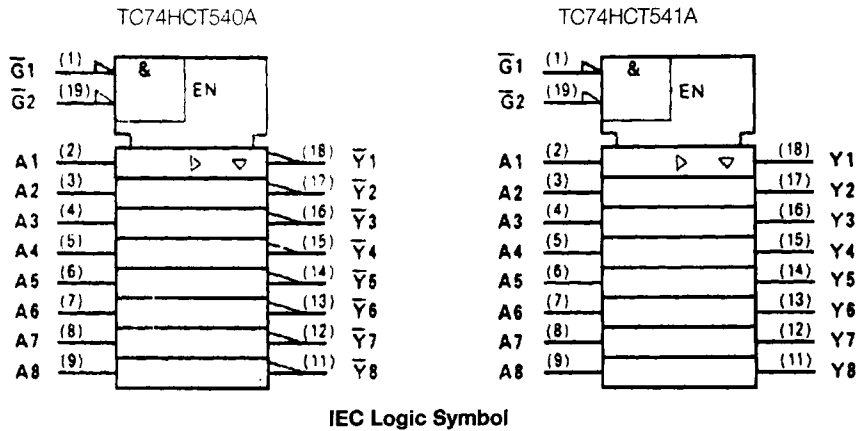
Truth Table

Inputs			Outputs	
$\bar{G}1$	$\bar{G}2$	A_n	Y_n	\bar{Y}_n^*
H	X	X	Z	Z
X	H	X	Z	Z
L	L	H	H	L
L	L	L	L	H

X: "H" or "L"
Z: High Impedance
*: Y_nHC541A
: \bar{Y}_nHC540A



Pin Assignment



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 - 7	V
DC Input Voltage	V_{IN}	-0.5 - $V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	-0.5 - $V_{CC} + 0.5$	V
Input Diode Current	I_{IK}	± 20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 35	mA
DC V_{CC} /Ground Current	I_{CC}	± 75	mA
Power Dissipation	P_D	500(DIP)*180(SOIC)	mW
Storage Temperature	T_{stg}	-65 - 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of $T_a = -40^\circ\text{C} - 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	4.5 - 5.5	V
Input Voltage	V_{IN}	0 - V_{CC}	V
Output Voltage	V_{OUT}	0 - V_{CC}	V
Operating Temperature	T_{opr}	-40 - 85	°C
Input Rise and Fall Time	t_r, t_f	0 - 500	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition	V_{CC}	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		Unit	
				Min.	Typ.	Max.	Min.	Max.		
High-Level Input Voltage	V_{IH}	-	4.5 ┆ 5.5	2.0	-	-	2.0	-	V	
Low-Level Input Voltage	V_{IL}	-	4.5 ┆ 5.5	-	-	0.8	-	0.8	V	
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu\text{A}$	4.5	4.4	4.5	-	4.4	-	V
			$I_{OH} = -6\text{mA}$	4.5	4.18	4.31	-	4.13	-	V
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20\mu\text{A}$	4.5	-	0.0	0.1	-	0.1	V
			$I_{OL} = 6\text{mA}$	4.5	-	0.17	0.26	-	0.33	V
3-State Output Off-State Current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5	-	-	± 0.5	-	± 5.0	μA	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	5.5	-	-	± 0.1	-	± 1.0		
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	5.5	-	-	4.0	-	40.0		
	ΔI_{CC}	Per Input: $V_{IN} = 0.5\text{V}$ or 2.4V Other Input: V_{CC} or GND	5.5	-	-	2.0	-	2.9	mA	

AC Electrical Characteristics (C_L = 50pF, Input t_r = t_f = 6ns)

Parameter	Symbol	Test Condition	Ta = 25°C			Ta = -40 ~ 85°C		Unit		
			CL	V _{CC}	Min.	Typ.	Max.		Min.	Max.
Output Transition Time	t _{TLH} t _{THL}	—	50	4.5 5.5	— —	7 6	12 11	— —	15 14	ns
Propagation Delay Time	t _{pLH}	TC74HCT540A	50	4.5 5.5	— —	12 9	20 18	25	23	
	t _{pHL}		150	4.5 5.5	— —	17 14	26 18	— —	33 30	
Propagation Delay Time	t _{pLH}	TC74HCT541A	50	4.5 5.5	— —	14 11	23 21	— —	29 27	
	t _{pHL}		150	4.5 5.5	— —	19 16	29 27	— —	36 33	
3-State Output Enable Time	t _{pZL}	R _L = 1k Ω	50	4.5 5.5	— —	18 16	30 27	— —	38 35	
	t _{pZH}		150	4.5 5.5	— —	23 21	36 33	— —	45 41	
3-State Output Disable Time	t _{pLZ}	R _L = 1k Ω	50	4.5 5.5	— —	18 16	30 27	— —	38 35	
	t _{pHZ}		50	4.5 5.5	— —	18 16	30 27	— —	38 35	
Input Capacitance	C _{IN}	—	—	—	—	5	10	—	10	
Output Capacitance	C _{OUT}	—	—	—	—	10	—	—	—	
Power Dissipation Capacitance	C _{PD(1)}	TC74HCT540A	—	—	—	35	—	—	—	
		TC74HCT541A	—	—	—	31	—	—	—	

Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:

$$I_{CC(oper)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8(\text{per bit})$$