

TC74ACT540P/F/FW, TC74ACT541P/F/FW

OCTAL BUS BUFFER
TC74ACT540P/F/FW **INVERTING, 3-STATE OUTPUTS**
TC74ACT541P/F/FW **NON-INVERTING, 3-STATE OUTPUTS**

The TC74ACT540/TC74ACT541 are advanced high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate and double-layer metal wiring C²MOS technology.

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

These devices may 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.

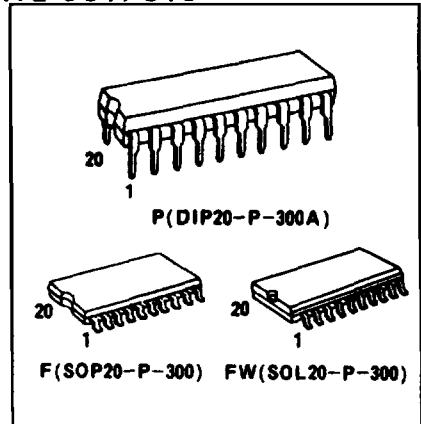
The TC74ACT540 is a non-inverting type, and the TC74ACT541 is an inverting type.

When either G1 or G2 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 $t_{pd} = 4.3ns$ (typ.) at $V_{CC} = 5V$
- Low Power Dissipation $I_{CC} = 8 \mu A$ (Max.) at $T_a = 25^\circ C$
- Compatible with TTL outputs $V_{IL} = 0.8V$ (Max.)
 $V_{IH} = 2.0V$ (Min.)
- Symmetrical Output Impedance $|I_{OH}| = I_{OL} = 24mA$ (Min.)
 Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74F540/541

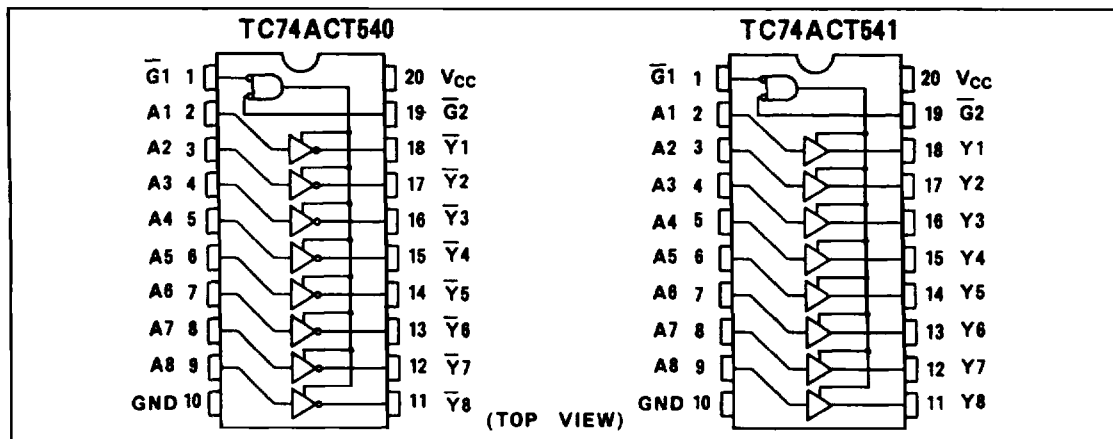


TRUTH TABLE

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 : Don't Care
 Z : High Impedance
 * : Y_n ACT541
 \bar{Y}_n ACT540

PIN ASSIGNMENT



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5 ~ 6.0	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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC} /Ground Current	I_{CC}	±200	mA
Power Dissipation	P_D	500(DIP)* / 180(SOP)	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of $T_a = -40^{\circ}\text{C} \sim 65^{\circ}\text{C}$. From $T_a = 65^{\circ}\text{C}$ to 85°C a derating factor of $-10\text{mW}/^{\circ}\text{C}$ 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	dt/dv	0 ~ 10	ns/v

DC ELECTRICAL CHARACTERISTICS

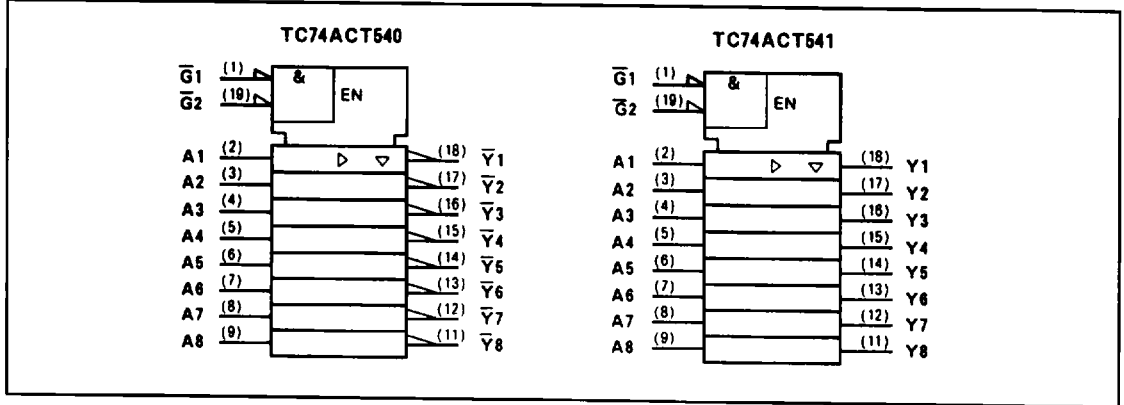
PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V_{IH}		4.5 } 5.5	2.0	-	-	2.0	-	V	
Low-Level Input Voltage	V_{IL}		4.5 } 5.5	-	-	0.8	-	0.8	V	
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50\mu\text{A}$	4.5	4.4	4.5	-	4.4	-	V
			$I_{OH} = -24\text{mA}$	4.5	3.94	-	3.80	-		
			$I_{OH} = -75\text{mA}^*$	5.5	-	-	3.85	-		
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\mu\text{A}$	4.5	-	0.0	0.1	-	0.1	V
			$I_{OL} = 24\text{mA}$	4.5	-	-	0.36	-	0.44	
			$I_{OL} = 75\text{mA}^*$	5.5	-	-	-	-	1.65	
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	-	-	8.0	-	80.0		
	ΔI_{CC}	PER INPUT: $V_{IN} = 3.4\text{V}$ OTHER INPUT: V_{CC} or GND	5.5	-	-	1.35	-	1.5	mA	

* This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

TOSHIBA CORPORATION

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IEC LOGIC SYMBOL



AC ELECTRICAL CHARACTERISTICS ($C_L=50\text{pF}$, $R_L=500\Omega$, Input $t_r=t_f=3\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	$T_a=25^\circ\text{C}$						UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time*	t_{pLH} t_{pHL}		5.0 ± 0.5	-	5.0	8.3	1.0	9.5	ns
Propagation Delay Time**	t_{pLH} t_{pHL}		5.0 ± 0.5	-	5.0	8.3	1.0	9.5	
Output Enable Time	t_{pZL} t_{pZH}		5.0 ± 0.5	-	7.3	11.4	1.0	13.0	
Output Disable Time	t_{pLZ} t_{pHZ}		5.0 ± 0.5	-	5.9	9.2	1.0	10.5	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Output Capacitance	C_{OUT}			-	10	-	-	-	
Power Dissipation Capacitance	C_{PD} (1)	TC74ACT540		-	24	-	-	-	
		TC74ACT541		-	27	-	-	-	

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:

$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_N + I_{CC} / 8 (\text{per bit})$$

(2) * for TC74ACT540 only

** for TC74ACT541 only