

TC74AC151P/F/FN, TC74AC251P/F/FN

TC74AC151P/F/FN 8-CHANNEL MULTIPLEXER TC74AC251P/F/FN 8-CHANNEL MULTIPLEXER (3-STATE)

The TC74AC151 and the TC74AC251 are advanced high speed CMOS 8-CHANNEL MULTIPLEXER fabricated with silicon gate and double-layer metal wiring C²MOS technology.

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

One of eight data input signals (D0-D7) is selected by decoding of the three-bit address input (A, B, C). The selected data appears on two outputs: non-inverting (Y) and inverting (W).

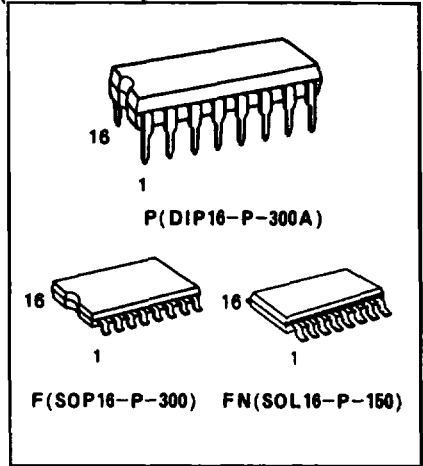
The STROBE input provides two output conditions; a low level on the STROBE input transfers the selected data to the outputs. A high level on the STROBE input of AC151 sets the Y output low and the W output high without regard to the data or select input conditions.

When the STROBE input of AC251 is held high, both outputs are in the high-impedance state.

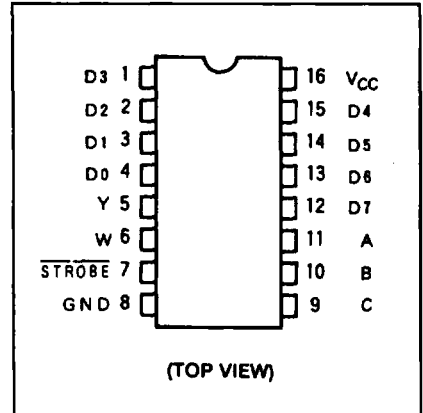
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

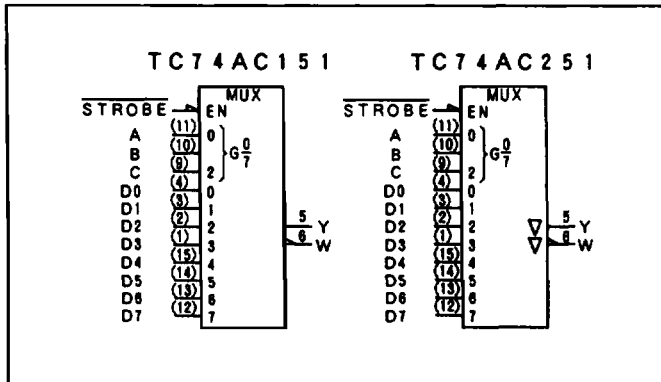
- High Speed $t_{pd}=5.3ns$ (typ.) at $V_{CC}=5V$
- Low Power Dissipation $I_{CC}=8\mu A$ (Max.) at $T_a=25^\circ C$
- High Noise Immunity $V_{NIH}=V_{NIL} 28\% V_{CC}$ (Min.)
- Symmetrical Output Impedance... $|I_{OH}|=|I_{OL}|=24mA$ (Min.)
Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range ... $V_{CC}(\text{opr})=2V\sim 5.5V$
- Pin and Function Compatible with 74F 151/251



PIN ASSIGNMENT



IEC LOGIC SYMBOL



TRUTH TABLE

INPUTS				OUTPUTS			
SELECT			STROBE	AC151		AC251	
C	B	A		Y	W	Y	W
X	X	X	H	L	H	Z	Z
L	L	L	L	D0	$\overline{D0}$	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$	D7	$\overline{D7}$

Z: High Impedance
X: Don't care

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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}	±100	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}	2.0~5.5	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	0~100($V_{CC}=3.3\pm 0.3\text{V}$)	ns/v
		0~ 20($V_{CC}= 5\pm 0.5\text{V}$)	

DC ELECTRICAL CHARACTERISTICS

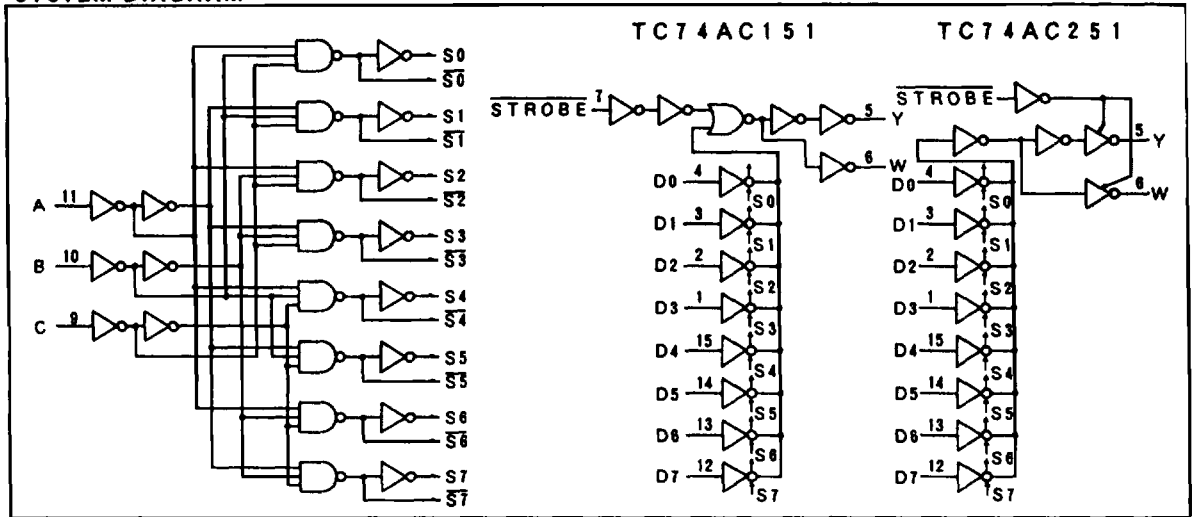
PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	$T_a=25^\circ\text{C}$			$T_a=-40\sim 85^\circ\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V_{IH}		2.0	1.50	-	-	1.50	-	V	
			3.0	2.10	-	-	2.10	-		
			5.5	3.85	-	-	3.85	-		
Low-Level Input Voltage	V_{IL}		2.0	-	-	0.50	-	0.50	V	
			3.0	-	-	0.90	-	0.90		
			5.5	-	-	1.65	-	1.65		
High-Level Output Voltage	V_{OH}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OH} = -50\mu\text{A}$	2.0	1.9	2.0	-	1.9	-	V
				3.0	2.9	3.0	-	2.9	-	
		3.0	$I_{OH} = -4\text{mA}$ $I_{OH} = -24\text{mA}$ $I_{OH} = -75\text{mA} *1$	3.0	2.58	-	-	2.48	-	
				4.5	3.94	-	-	3.80	-	
Low-Level Output Voltage	V_{OL}	$V_{IN} =$ V_{IH} or V_{IL}	$I_{OL} = 50\mu\text{A}$	2.0	-	0.0	0.1	-	0.1	V
				3.0	-	0.0	0.1	-	0.1	
		3.0	$I_{OL} = 12\text{mA}$ $I_{OL} = 24\text{mA}$ $I_{OL} = 75\text{mA} *1$	3.0	-	-	0.36	-	0.44	
				4.5	-	-	0.36	-	0.44	
5.5	-	-	-	-	1.65	-				
3-State Output *2 Off-State Current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5	-	-	±0.5	-	±0.5		
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	μA	

- *1: This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.
*2: for TC74AC251 only.

TOSHIBA CORPORATION

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SYSTEM DIAGRAM



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

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.	
Propagation Delay Time (D-Y.W)	t_{pLH}		3.3 ± 0.3	-	10.7	19.3	-	22.0	ns
	t_{pHL}		5.0 ± 0.5	-	6.6	10.5	-	12.0	
Propagation Delay Time (A, B, C-Y.W)	t_{pLH}		3.3 ± 0.3	-	13.3	23.7	-	27.0	
	t_{pHL}		5.0 ± 0.5	-	8.2	13.0	-	14.8	
Propagation Delay Time (\overline{ST} -Y.W) *	t_{pLH}		3.3 ± 0.3	-	8.6	15.3	-	18.0	
	t_{pHL}		5.0 ± 0.5	-	5.6	9.6	-	11.0	
Output Enable Time **	t_{pZL}		3.3 ± 0.3	-	6.4	13.2	-	15.0	
	t_{pZH}		5.0 ± 0.5	-	4.4	7.9	-	9.0	
Output Disable Time **	t_{pLZ}		3.3 ± 0.3	-	5.9	11.4	-	13.0	
	t_{pHZ}		5.0 ± 0.5	-	5.0	8.8	-	10.0	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Output Capacitance **	C_{OUT}			-	10	-	-	-	
Power Dissipation Capacitance	$C_{PD(1)}$	TC74AC151		-	68	-	-	-	
		TC74AC251		-	72	-	-	-	

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:

$$I_{CC(tpd)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

- (2) • for TC74AC151 only
 ** for TC74AC251 only