TC74AC153P/F/FN, TC74AC253P/F/FN

TC74AC153P/F/FN DUAL 4-CHANNEL MULTIPLEXER
TC74AC253P/F/FN DUAL 4-CHANNEL MULTIPLEXER WITH 3-STATE OUTPUT

The TC74AC153 and TC74AC253 are advanced high speed CMOS DUAL 4-CHANNEL MULTIPLEXERs fabricated with silicon gate and double-layer metal wiring C^2MOS technology.

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

The designer has a choice of complementary output (AC153) or 3-state output (AC253).

Each of the data input groups (1C0–1C3, 2C0–2C3) is selected by the two address inputs A and B.

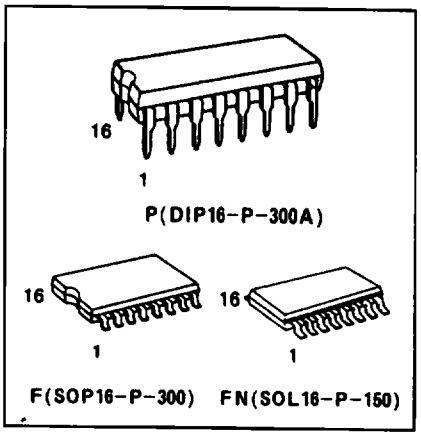
Separate strobes ($1\overline{G}$, $2\overline{G}$) are provided for each of the two four-line sections.

The strobe ($\overline{G}$) can be used to inhibit the data output ; the output of ACT153 is held low and the output of ACT253 is held in the high impedance state unconditionally, while the strobe input is held low.

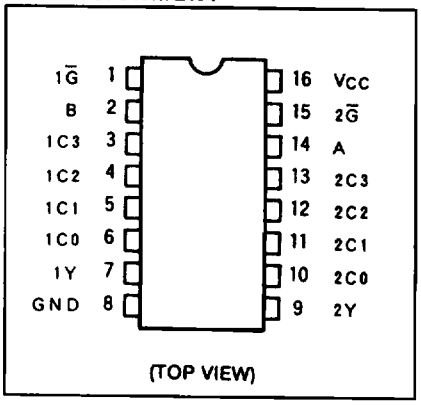
All inputs are equipped with protection circuit against static discharge or transient excess voltage.

FEATURES:

- High Speed ..... t_{pd}=3.9ns(typ.) at V_{CC}=5V
- Low Power Dissipation ..... I_{CC}=8μA(Max.) at Ta=25℃
- 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 ..... $t_{pLH} \fallingdotseq t_{pHL}$
- Wide Operating Voltage Range ... V_{CC}(opr.)=2V~5.5V
- Pin and Function Compatible with 74F153/253



PIN ASSIGNMENT

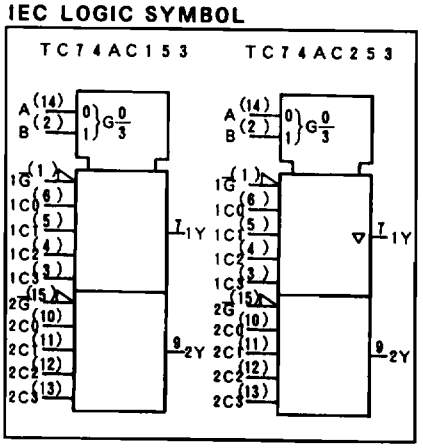


TRUTH TABLE

SELECT INPUTS		DATA INPUTS				STROBE	OUTPUT Y	
B	A	C0	C1	C2	C3	$\overline{G}$	AC153	AC253
X	X	X	X	X	X	H	L	Z
L	L	L	X	X	X	L	L	L
L	L	H	X	X	X	L	H	H
L	H	X	L	X	X	L	L	L
L	H	X	H	X	X	L	H	H
H	L	X	X	L	X	L	L	L
H	L	X	X	H	X	L	H	H
H	H	X	X	X	L	L	L	L
H	H	X	X	X	H	L	H	H

X:Don't care Z:High Impedans

IEC LOGIC SYMBOL



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	℃
Lead Temperature 10sec	T_L	300	℃

*500mW in the range of Ta= −40℃~ 65℃. From Ta=65℃ to 85℃ a derating factor of −10mW/℃ shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

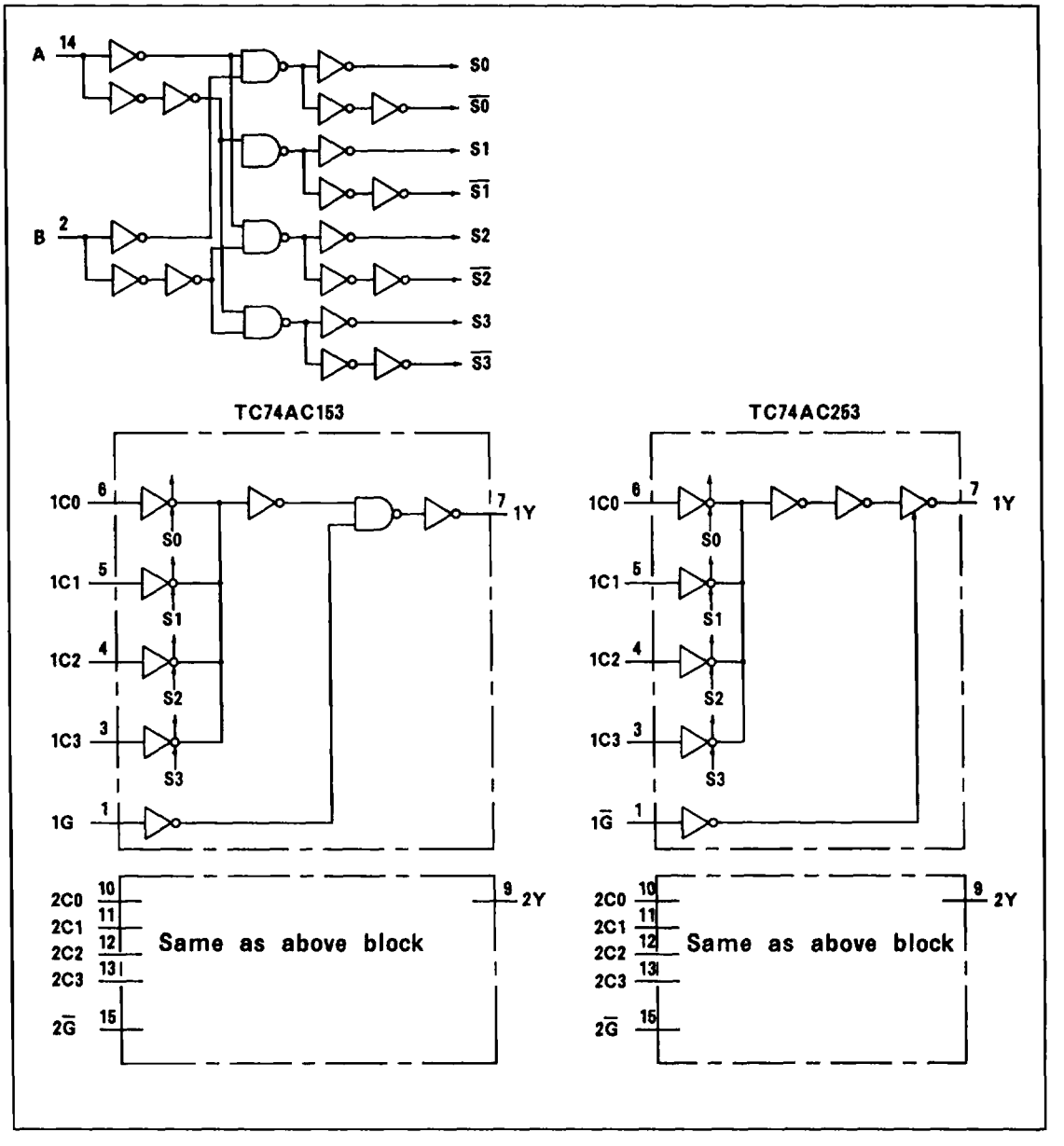
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	−40 ~ 85	℃
Input Rise and Fall Time	dt/dv	0~100(V_{CC}=3.3±0.3V) 0~ 20(V_{CC}= 5 ±0.5V)	ns/v

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25℃ MIN.	Ta=25℃ TYP.	Ta=25℃ MAX.	Ta=−40~85℃ MIN.	Ta=−40~85℃ MAX.	UNIT
High−Level Input Voltage	V_{IH}			2.0 3.0 5.5	1.50 2.10 3.85	− − −	− − −	1.50 2.10 3.85	− − −	V
Low−Level Input Voltage	V_{IL}			2.0 3.0 5.5	− − −	− − −	0.50 0.90 1.65	− − −	0.50 0.90 1.65	V
High−Level Output Voltage	V_{OH}	V_{IN}= V_{IH} or V_{IL}	I_{OH}=−50μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	− − −	1.9 2.9 4.4	− − −	V
			I_{OH}=−4mA I_{OH}=−24mA I_{OH}=−75mA*1	3.0 4.5 5.5	2.58 3.94 −	− − −	− − −	2.48 3.80 3.85	− − −	
Low−Level Output Voltage	V_{OL}	V_{IN}= V_{IH} or V_{IL}	I_{OL}=50μA	2.0 3.0 4.5	− − −	0.0 0.0 0.0	0.1 0.1 0.1	− − −	0.1 0.1 0.1	V
			I_{OL}=12mA I_{OL}=24mA I_{OL}=75mA*1	3.0 4.5 5.5	− − −	− − −	0.36 0.36 −	− − −	0.44 0.44 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	V
Input Leakage Current	I_{IN}	V_{IN} =V_{CC} or GND		5.5	−	−	±0.1	−	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} =V_{CC} or GND		5.5	−	−	8.0	−	80.0	

* 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 TC74AC153 only

SYSTEM DIAGRAM



AC ELECTRICAL CHARACTERISTICS(C_L=50pF, R_L=500Ω, Input $t_r=t_f$=3ns)

PARAMETER	SYMBOL	TEST CONDITION		Ta=25℃			Ta=−40 ~85℃		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time (Cn−Y)	t_{pLH}		3.3±0.3	−	7.6	14.5	1.0	16.5	ns
	t_{pHL}		5.0±0.5	−	5.0	9.0	1.0	10.3	
Propagation Delay Time (A, B−Y)	t_{pLH}		3.3±0.3	−	10.5	20.5	1.0	23.4	
	t_{pHL}		5.0±0.5	−	6.6	10.5	1.0	12.0	
Propagation Delay Time ($\overline{G}$−Y) *	t_{pLH}		3.3±0.3	−	6.8	13.3	1.0	15.2	
	t_{pHL}		5.0±0.5	−	4.4	8.0	1.0	9.1	
Output Enable Time **	t_{pZL}		3.3±0.3	−	6.6	13.3	1.0	15.2	
	t_{pZH}		5.0±0.5	−	4.4	8.0	1.0	9.1	
Output Disable Time **	t_{pLZ}		3.3±0.3	−	5.5	9.0	1.0	10.3	
	t_{pHZ}		5.0±0.5	−	5.0	7.5	1.0	8.5	
Input Capacitance	C_{IN}			−	5	10	−	10	pF
Output Capacitance **	C_{OUT}			−	10	−	−	−	
Power Dissipation Capacitance	C_{PD}(1)			−	54	−	−	−	

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:

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

(2) * for TC74AC153 only
** for TC74AC253 only