

TC74HC153AP/AF/AFN TC74HC253AP/AF/AFN

TC74HC153 Dual 4-Channel Multiplexer

TC74HC253 Dual 4-Channel Multiplexer with 3-State Output

The TC74HC153A and TC74HC253A are high speed CMOS DUAL 4-CHANNEL MULTIPLEXERS fabricated with silicon gate C²MOS technology.

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

The TC74HC153A has standard outputs, while the TC74HC253A has 3-state outputs.

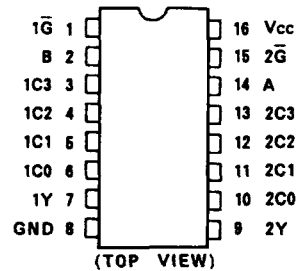
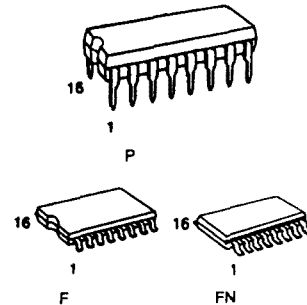
Input data (1C0 ~ 1C2, 2C0 ~ 2C3) are selected by the two address inputs, A and B.

Separate strobe inputs (1G, 2G) are provided for each of the two four-line sections. They can be used to inhibit the data outputs. The output of the HC153A is set low, and the HC253A output is set to the high impedance state, when the strobe inputs are low.

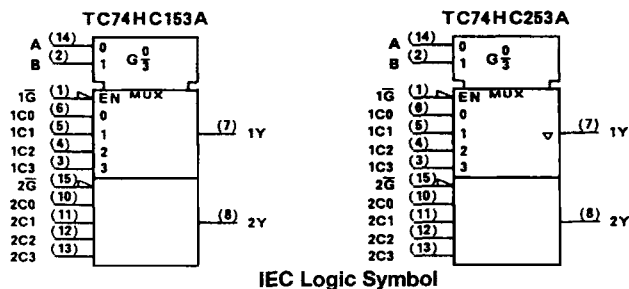
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Features

- High Speed: $t_{pd} = 12\text{ns}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation: $I_{CC} = 4\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\%V_{CC}$ (Min.)
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $I_{OH} = I_{OL} = 4\text{mA}$ (Min.)
- Balanced Propagation Delays: $t_{PLH} = t_{PHL}$
- Wide Operating Voltage Range: $V_{CC}(\text{opr}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS153, 74LS253



Pin Assignment



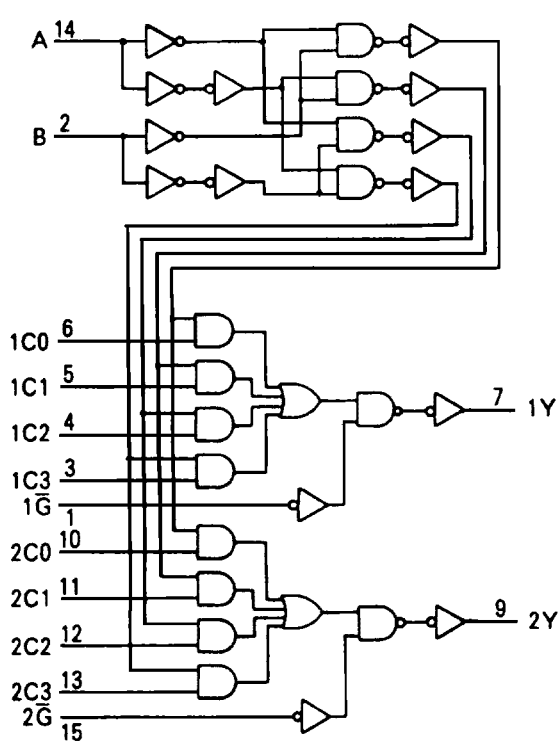
IEC Logic Symbol

Truth Table

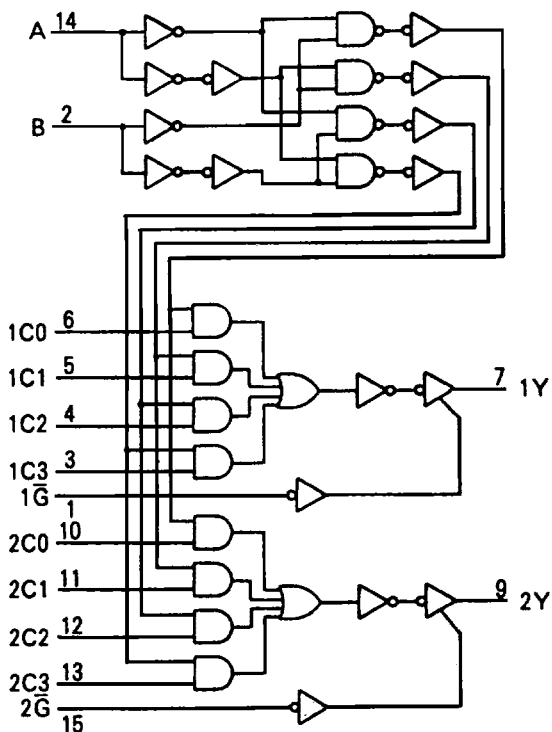
Inputs		Data Inputs				Strobe	Output Y	
B	A	C0	C1	C2	C3	\bar{G}	HC153A	HC253A
X	X	X	X	X	X	H	L	Z
L	L	L	X	X	X	L	L	L
L	L	H	X	X	X	L	H	H
L	H	X	L	X	X	L	L	L
L	H	X	H	X	X	L	H	H
H	L	X	X	L	X	L	L	L
H	L	X	X	H	X	L	H	H
H	H	X	X	X	L	L	L	L
H	H	X	X	X	H	L	H	H

X: Don't Care
Z: High Impedance

74HC153A



74HC253A



Logic Diagram

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}	±25	mA
DC V _{CC} /Ground Current	I _{CC}	±50	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 Ta = -40°C ~ 65°C. From Ta = 65°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}	2 - 6	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 - 1000(V _{CC} = 2.0V) 0 - 500(V _{CC} = 4.5V) 0 - 400(V _{CC} = 6.0V)	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition	Ta = 25°C				Ta = -40 ~ 85°C		Unit
			V _{CC}	Min.	Typ.	Max.	Min.	Max.	
High-Level Input Voltage	V _{IH}	-	2.0	1.5	-	-	1.5	-	V
			4.5	3.15	-	-	3.15	-	
			6.0	4.2	-	-	4.2	-	
Low-Level Input Voltage	V _{IL}	-	2.0	-	-	0.5	-	0.5	V
			4.5	-	-	1.35	-	1.35	
			6.0	-	-	1.8	-	1.8	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL} I _{OH} = -20µA	2.0	1.9	2.0	-	1.9	-	V
			4.5	4.4	4.5	-	4.4	-	
			6.0	5.9	6.0	-	5.9	-	
			4.5	4.18	4.31	-	4.13	-	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL} I _{OL} = 20µA	2.0	-	0.0	0.1	-	0.1	V
			4.5	-	0.0	0.1	-	0.1	
			6.0	-	0.0	0.1	-	0.1	
			4.5	-	0.17	0.26	-	0.33	
Input Leakage Current	I _{OZ} *	V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND	6.0	-	-	±0.5	-	±5.0	µA
			6.0	-	-	±0.1	-	±1.0	
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND	6.0	-	-	4.0	-	40.0	

* TC = 74HC253A only

AC Electrical Characteristics (C_L = 15pF, V_{CC} = 5V, Ta = 25°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Transition Time	t _{TLH} t _{THL}	–	–	4	8	ns
Propagation Delay Time (Cn-Y)	t _{PLH} t _{PHL}	–	–	12	19	
Propagation Delay Time (A, B-Y)	t _{PLH} t _{PHL}	–	–	17	26	
Propagation Delay Time (G-Y)*	t _{PLH} t _{PHL}	–	–	8	16	
3-State Output Enable Time (G-Y)**	t _{PZL} t _{PZH}	–	–	9	16	

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

Parameter	Symbol	Test Condition	Ta = 25°C			Ta = -40 ~ 85°C		Unit	
			V _{CC}	Min.	Typ.	Max.	Min.		Max.
Output Transition Time	t _{TLH} t _{THL}	–	2.0	–	30	75	–	95	ns
			4.5	–	8	15	–	19	
			6.0	–	7	13	–	16	
Propagation Delay Time (Cn-Y)	t _{PLH} t _{PHL}	–	2.0	–	48	115	–	145	
			4.5	–	15	23	–	29	
			6.0	–	12	20	–	25	
Propagation Delay Time (A, B-Y)	t _{PLH} t _{PHL}	–	2.0	–	68	150	–	190	
			4.5	–	20	30	–	38	
			6.0	–	16	26	–	33	
Propagation Delay Time (G-Y)*	t _{PLH} t _{PHL}	–	2.0	–	31	95	–	120	
			4.5	–	11	19	–	24	
			6.0	–	9	16	–	20	
3-State Output Enable Time (G-Y)**	t _{PZL} t _{PZH}	–	2.0	–	36	100	–	125	
			4.5	–	12	20	–	24	
			6.0	–	9	17	–	21	
3-State Output Enable Time (G-Y)**	t _{PLZ} t _{PHZ}	–	2.0	–	22	115	–	145	
			4.5	–	13	23	–	29	
			6.0	–	11	20	–	25	
Input Capacitance	C _{IN}	–	–	5	10	–	10	pF	
Power Dissipation Capacitance	C _{PD(1)}	TC74HC153A	–	58	–	–	–		–
		TC74HC253A	–	59	–	–	–	–	

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:

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

* for TC74HC153A only

** for TC74HC253A only