

8-Channel Multiplexer (3-State)

The TC74HC251A is high speed CMOS 8-CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS technology.

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

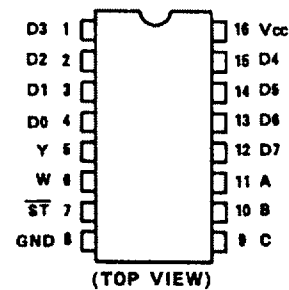
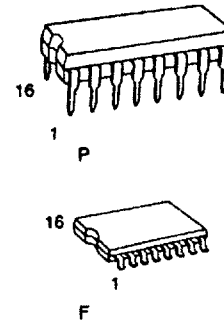
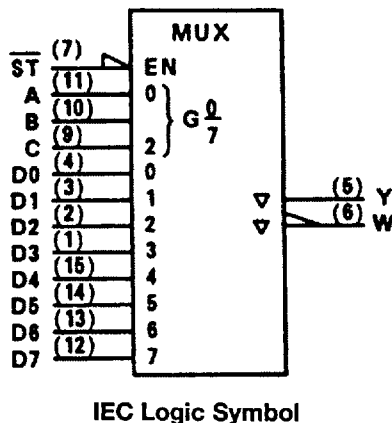
One of eight data input signals (D0 ~ D7) is selected by decoding of the address inputs (A, B, C). The selected data appears on two output; non-inverting (Y) and inverting (W).

When the strobe input 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: $t_{pd} = 15\text{ns}$ (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: $V_{CC(opr)} = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS245, 640, 643



Pin Assignment

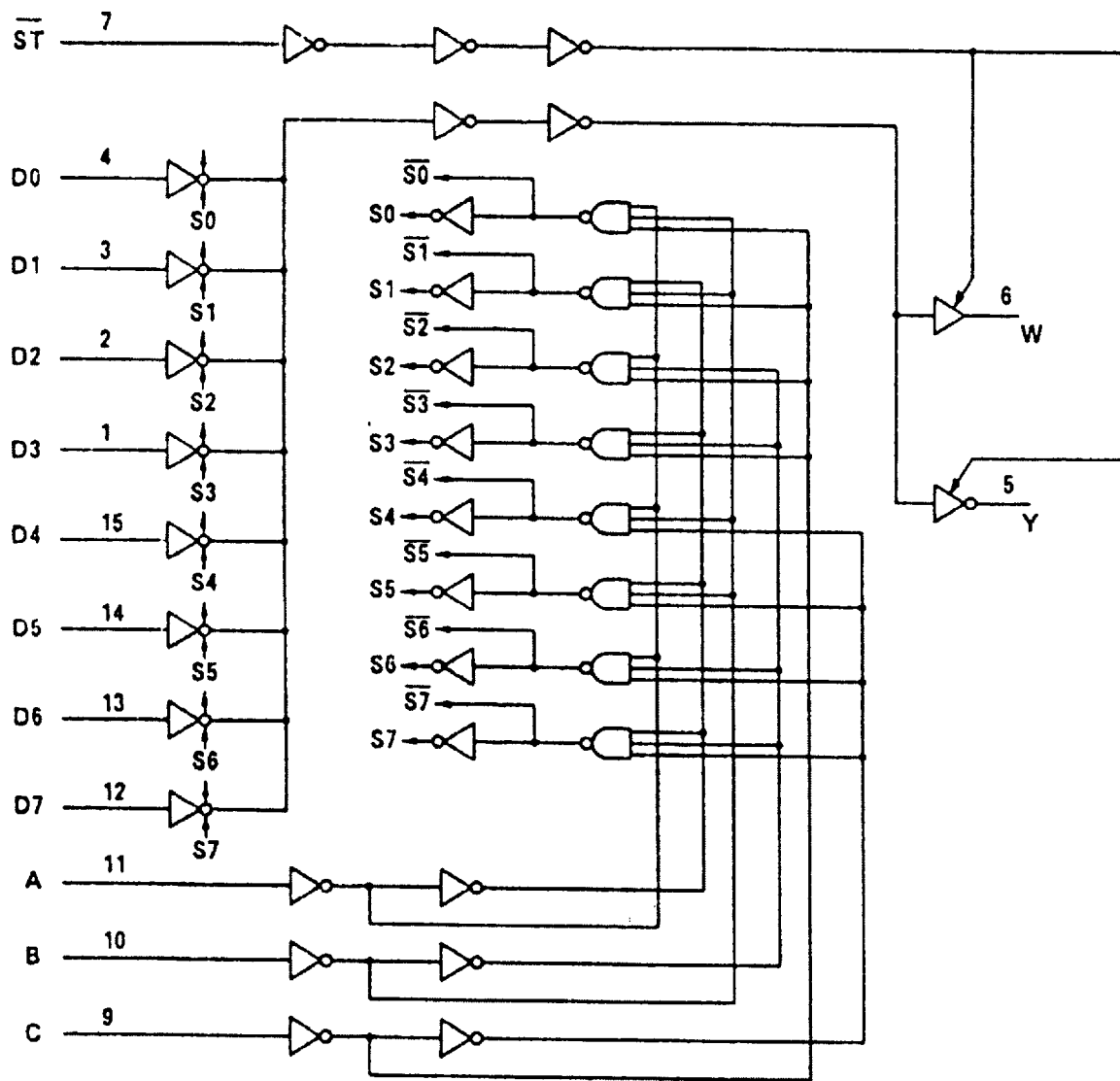
Truth Table

Inputs				Outputs	
Select			Strobe	Y	W
C	B	A	\overline{ST}		
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

X: Don't Care
Z: High Impedance

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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(MFP)	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 - 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($V_{CC} = 2.0\text{V}$) 0 - 500($V_{CC} = 4.5\text{V}$) 0-400($V_{CC} = 6.0\text{V}$)	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		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}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20\mu\text{A}$	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	-	
			$I_{OH} = -4 \text{ mA}$ $I_{OH} = -5.2 \text{ mA}$	4.5	4.18	4.31	-	4.13	-	
				6.0	5.68	5.80	-	5.63	-	
				6.0	-	-	-	-	-	
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20\mu\text{A}$	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	
			$I_{OL} = 4 \text{ mA}$ $I_{OL} = 5.2 \text{ mA}$	4.5	-	0.17	0.26	-	0.33	
				6.0	-	0.18	0.26	-	0.33	
				6.0	-	-	-	-	-	
3-State Output Off-State Current	I_{OZ}	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or } \text{GND}$	6.0	-	-	± 0.5	-	± 5.0	μA	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC} \text{ or } \text{GND}$	6.0	-	-	± 0.1	-	± 1.0		
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or } \text{GND}$	6.0	-	-	4.0	-	40.0		

TC74HC251AP/AF

AC Electrical Characteristics ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Transition Time	t_{TLH} t_{THL}	-	-	4	8	ns
Propagation Delay Time (D-Y)	t_{pLH} t_{pHL}	-	-	14	24	
Propagation Delay Time (D-W)	t_{pLH} t_{pHL}	-	-	15	24	
Propagation Delay Time (A, B, CAY)	t_{pLH} t_{pHL}	-	-	19	31	
Propagation Delay Time (A, B, C-W)	t_{pLH} t_{pHL}	-	-	19	31	
3-State Output Enable Time	t_{pZL} t_{pZH}	-	-	10	18	

AC Electrical Characteristics ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

Parameter	Symbol	Test Condition	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		Unit
			V_{CC}	Min.	Typ.	Max.	Min.	
Output Transition Time	t_{TLH} t_{THL}	-	2.0	-	30	75	-	95
			4.5	-	8	15	-	19
			6.0	-	7	13	-	16
Propagation Delay Time (D-Y)	t_{pLH} t_{pHL}	-	2.0	-	65	140	-	175
			4.5	-	17	28	-	35
			6.0	-	14	24	-	30
Propagation Delay Time (D-W)	t_{pLH} t_{pHL}	-	2.0	-	70	140	-	175
			4.5	-	18	28	-	35
			6.0	-	15	24	-	30
Propagation Delay Time (A, B, C-Y)	t_{pLH} t_{pHL}	-	2.0	-	80	180	-	225
			4.5	-	23	36	-	45
			6.0	-	19	31	-	38
Propagation Delay Time (A, B, C-W)	t_{pLH} t_{pHL}	-	2.0	-	80	180	-	225
			4.5	-	23	36	-	45
			6.0	-	19	31	-	38
3-State Output Enable Time	t_{pZL} t_{pZH}	$R_L = 1\text{k}\Omega$	2.0	-	40	105	-	130
			4.5	-	13	21	-	26
			6.0	-	10	19	-	22
3-State Output Disable Time	t_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	2.0	-	25	105	-	130
			4.5	-	13	21	-	26
			6.0	-	11	19	-	22
Input Capacitance	C_{IN}	DIR, G	-	5	10	-	10	pF
Power Dissipation Capacitance	$C_{PD}(1)$	TC74HC245A	-	69	-	-	-	

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