8-Channel Multiplexer (3-State)

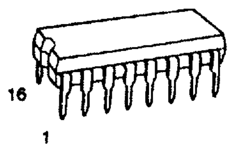
The TC74HC251A is high speed CMOS 8-CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS technology.

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

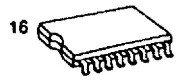
One of eight data input signals (D0 ~ D7) is selected by decoding of the address inputs (A, B, C). The selected data appears on two output; non-inverting (Y) and inverting (W).

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.



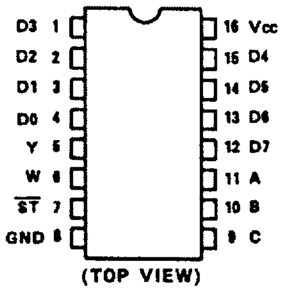
P



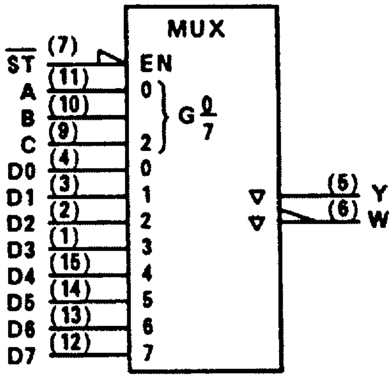
F

Features

- High Speed: t_{pd} = 15ns(Typ.) at V_{CC} = 5V
- Low Power Dissipation: I_{CC} = 4μA(Max.) at Ta = 25°C
- High Noise Immunity: $V_{NIH} = V_{NIL}$ = 28% V_{CC} (Min)
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL}$ = 4mA(Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Wide Operating Voltage Range: V_{CC}(opr) = 2V ~ 6V
- Pin and Function Compatible with 74LS245, 640, 643



Pin Assignment

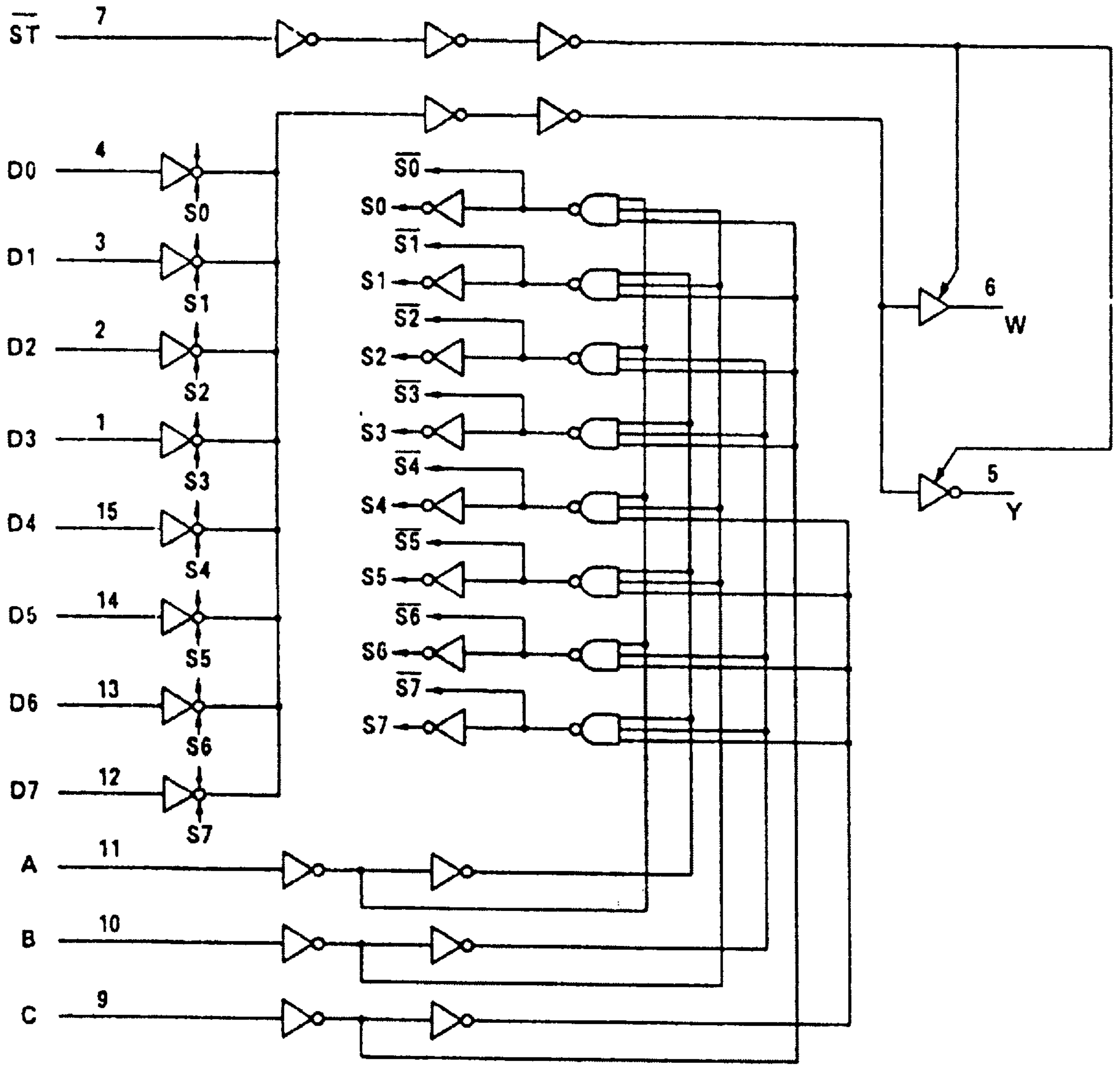


IEC Logic Symbol

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



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 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		V_{CC}	Ta = 25°C Min.	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40 ~ 85°C Min.	Ta = -40 ~ 85°C Max.	Unit
High-Level Input Voltage	V_{IH}	–		2.0 4.5 6.0	1.5 3.15 4.2	– – –	– – –	1.5 3.15 4.2	– – –	V
Low-Level Input Voltage	V_{IL}	–		2.0 4.5 6.0	– – –	– – –	0.5 1.35 1.8	– – –	0.5 1.35 1.8	V
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20μA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	– – –	1.9 4.4 5.9	– – –	V
			I_{OH} = -4 mA I_{OH} = -5.2mA	4.5 6.0	4.18 5.68	4.31 5.80	– –	4.13 5.63	– –	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20μA	2.0 4.5 6.0	– – –	0.0 0.0 0.0	0.1 0.1 0.1	– – –	0.1 0.1 0.1	V
			I_{OL} = 4 mA I_{OL} = 5.2mA	4.5 6.0	– –	0.17 0.18	0.26 0.26	– –	0.33 0.33	
3-State Output Off-State Current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		6.0	–	–	±0.5	–	±5.0	μA
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	–	–	±0.1	–	±1.0	
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	–	–	4.0	–	40.0	

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 (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 = 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 4.5 6.0	– – –	30 8 7	75 15 13	– – –	95 19 16	ns
Propagation Delay Time (D-Y)	t_{pLH} t_{pHL}	–	2.0 4.5 6.0	– – –	65 17 14	140 28 24	– – –	175 35 30	
Propagation Delay Time (D-W)	t_{pLH} t_{pHL}	–	2.0 4.5 6.0	– – –	70 18 15	140 28 24	– – –	175 35 30	
Propagation Delay Time (A, B, C-Y)	t_{pLH} t_{pHL}	–	2.0 4.5 6.0	– – –	80 23 19	180 36 31	– – –	225 45 38	
Propagation Delay Time (A, B, C-W)	t_{pLH} t_{pHL}	–	2.0 4.5 6.0	– – –	80 23 19	180 36 31	– – –	225 45 38	
3-State Output Enable Time	t_{pZL} t_{pZH}	R_L = 1kΩ	2.0 4.5 6.0	– – –	40 13 10	105 21 19	– – –	130 26 22	
3-State Output Disable Time	t_{pLZ} t_{pHZ}	R_L = 1kΩ	2.0 4.5 6.0	– – –	25 13 11	105 21 19	– – –	130 26 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:
$I_{CC(opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}/8$(per bit)