



SPXXHC151 SPXXHC153 SPXXHC251 SPXXHC253

54/74 Series 4/8 Input Multiplexers

Features

- Utilizes SPI's Selective Oxidation, Silicon-Gate CMOS Process.
- Speed, function and pin-out compatible to 74LS series Logic.
- High Noise Immunity.
- Low quiescent power consumption.
- Wide power supply range.
- Operates over V_{CC} range of 2.0 to 6.0 Volts.
- Symmetric current drive.
- All Inputs are fully buffered.
- All devices have Input Protection diodes to V_{CC} and ground.
- All devices have Logic Input voltage levels consistent with CMOS.

All devices contain diodes to protect inputs against damage due to high static voltages or electric fields; however, it is advised that precautions be taken not to exceed the maximum recommended input voltages. All unused inputs must be connected to an appropriate logic voltage level (either V_{CC} or GND).

Ordering Information

Plastic DIP, Industrial Temp Range	Ceramic DIP, Industrial Temp Range	Ceramic DIP, Military Temp Range
SP74HCXXXN	SP74HCXXXJ	SP54HCXXXJ

Absolute Maximum Ratings

Parameter	Min	Max	Units
V_{CC} DC Supply Voltage	-0.5	+7.0	V
V_I, V_O Input or Output Voltage	-0.5	$V_{CC} + 0.5$	V
I_L DC Current Per Pin Any Input or Output	—	25	mA
I_{CC} DC Current Drain, V_{CC} or GND	—	50	mA
T_S Storage Temperature	-65	+150	°C
P_D Power Dissipation (Note 1)	—	500	mW
T_L Lead Temperature (1/16" from mounting surface for 10 sec)	—	+300	°C

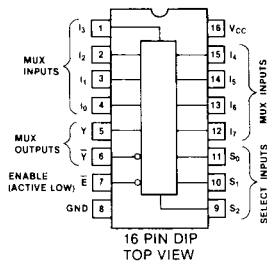
Note 1: Derate at 12mW/°C over +45 to +85°C for Plastic "N" Package.

Recommended Operating Conditions

Parameter	SP74HCXXX		SP54HCXXX		Units
	Min	Max	Min	Max	
V_{CC} DC Supply Voltage Range	2.0	6.0	2.0	6.0	V
V_I, V_O Input Voltage, Output Voltage	0	V_{CC}	0	V_{CC}	V
T_A Operating Temperature Range	-40	+85	-55	+125	°C

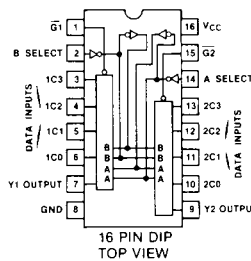
SPXXHC151

8 Input Multiplexer



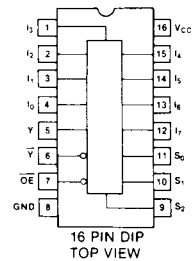
SPXXHC153

Dual 4-Input Multiplexer



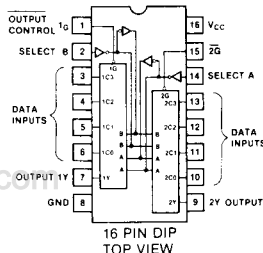
SPXXHC251

8-Input Multiplexer, 3-State Outputs



SPXXHC253

Dual 4-Input Multiplexer,
3-State Output



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DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC}	Typ T = 25 °C	Guaranteed Limits		Units	
					SP74HC -40 to +85 °C	SP54HC -55 to +125 °C		
V _{IH}	Minimum High Level Input Voltage	V _O = 0.1V or V _{CC} - 0.1V I _O ≤ 20 μA	2.0V		1.5	1.5	V	
			4.5V		3.15	3.15		
			6.0V		4.2	4.2		
V _{IL}	Maximum Low Level Input Voltage	V _O = 0.1V or V _{CC} - 0.1V I _O ≤ 20 μA	2.0V		0.3	0.3	V	
			4.5V		0.9	0.9		
			6.0V		1.2	1.2		
V _{OH}	Minimum High Level Output Voltage	I _{OH} = 20 μA V _I = V _{CC} or GND	2.0V	2.0	1.9	1.9	V	
			4.5V	4.5	4.4	4.4		
			6.0V	6.0	5.9	5.9		
			4.5V	*	3.7	3.7		
V _{OL}	Maximum Low Level Output Voltage	I _{OL} = 20 μA V _I = V _{CC} or GND	2.0V	0	0.1	0.1	V	
			4.5V	0	0.1	0.1		
			6.0V	0	0.1	0.1		
			4.5V	0.1	0.3	0.4		
I _{IN}	Input Leakage Current	V _I = V _{CC} or GND V _{CC} = 2.0 to 6.0V			±1.0	±1.0	μA	
I _{CC}	Maximum Quiescent Supply Current	V _I = V _{CC} or GND I _O = 0 μA	T _A = 25 °C	5.0V	0.1	2.0	2.0	μA
			T _A = 85 °C	5.0V		20.0	20.0	
			T _A = 125 °C	5.0V			40.0	
I _{OZH} I _{OZL}	Output Off Current	V _{OUT} = V _{CC} or GND	T _A = 25 °C	5.0V	0.1	1.0	1.0	μA
			T _A = 85 °C	5.0V		5.0	5.0	
			T _A = 125 °C	5.0V			10.0	

* 4ma STD outputs 6ma Bus-Drivers

AC Electrical Characteristics (V_{CC} = 5.0V, t_r = t_f = 6ns, T_A = 25 °C, unless otherwise specified)

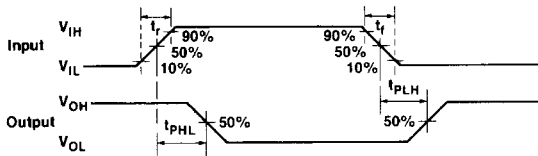
Device Type	Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
151	t _{PHL} , t _{PLH}	Select to Y	C _L = 15pF	31		ns
			C _L = 50pF	34		
	t _{PHL} , t _{PLH}	Select to \bar{Y}	C _L = 15pF	30		ns
			C _L = 50pF	33		
	t _{PHL} , t _{PLH}	Data to Y	C _L = 15pF	28		ns
			C _L = 50pF	31		
	t _{PHL} , t _{PLH}	Data to \bar{Y}	C _L = 15pF	26		ns
C _L = 50pF			29			
t _{PHL} , t _{PLH}	Enable to Y	C _L = 15pF	14		ns	
		C _L = 50pF	16			
t _{PHL} , t _{PLH}	Enable to \bar{Y}	C _L = 15pF	16		ns	
		C _L = 50pF	19			
C _{in}	Input Capacitance		2		pF	
153	t _{PHL} , t _{PLH}	Select to Y	C _L = 15pF	16		ns
			C _L = 50pF	18		
	t _{PHL} , t _{PLH}	Enable to Y	C _L = 15pF	12		ns
			C _L = 50pF	14		
t _{PHL} , t _{PLH}	Data to Y	C _L = 15pF	16		ns	
		C _L = 50pF	18			
C _{in}	Input Capacitance		2		pF	

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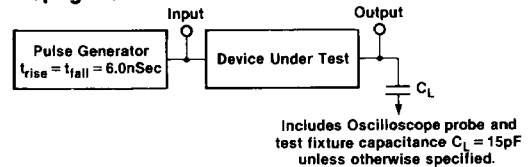
AC Electrical Characteristics ($V_{CC} = 5.0V$, $t_r = t_f = 6ns$, $T_A = 25^\circ C$, unless otherwise specified) CONTINUED

Device Type	Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
251	t_{PHL}, t_{PLH}	Data to Y	$C_L = 15pF$ $C_L = 50pF$	29 33		ns
	t_{PHL}, t_{PLH}	Data to \bar{Y}	$C_L = 15pF$ $C_L = 50pF$	31 35		ns
	t_{PHL}, t_{PLH}	Select to Y	$C_L = 15pF$ $C_L = 50pF$	34 38		ns
	t_{PHL}, t_{PLH}	Select to \bar{Y}	$C_L = 15pF$ $C_L = 50pF$	35 38		ns
	t_{PHZ}, t_{PLZ}	Disable from High/Low	$C_L = 15pF$ $C_L = 50pF$	13 16		ns
	t_{PZH}, t_{PZL}	Enable to High/Low	$C_L = 15pF$ $C_L = 50pF$	18 21		ns
	C_{IN}	Input Capacitance		2		pF
253	t_{PHL}, t_{PLH}	Data to Q	$C_L = 15pF$ $C_L = 50pF$	17 20		ns
	t_{PHL}, t_{PLH}	Select to Q	$C_L = 15pF$ $C_L = 50pF$	22 24		ns
	t_{PZH}, t_{PZL}	Enable to High/Low	$C_L = 15pF$ $C_L = 50pF$	16 20		ns
	t_{PHZ}, t_{PLZ}	Disable from High/Low	$C_L = 15pF$ $C_L = 50pF$	13 17		ns
	C_{in}	Input Capacitance		2		pF

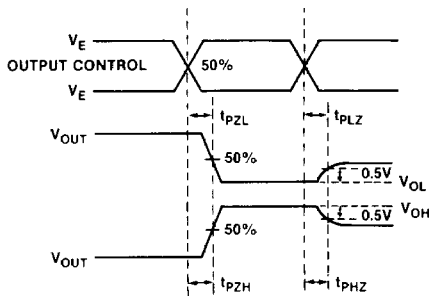
AC Waveforms



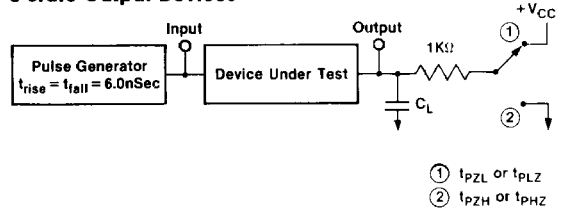
Propagation Time Test Circuit



Voltage Waveforms Enable & Disable Times, 3-State Outputs



Propagation Time Test Circuit 3-State Output Devices





Mode Select and Function Tables

HC151

Inputs				Outputs	
\bar{E}	S_2	S_1	S_0	\bar{Z}	Z
H	X	X	X	H	L
L	L	L	L	\bar{I}_0	I_0
L	L	L	H	\bar{I}_1	I_1
L	L	H	L	\bar{I}_2	I_2
L	L	H	H	\bar{I}_3	I_3
L	H	L	L	\bar{I}_4	I_4
L	H	L	H	\bar{I}_5	I_5
L	H	H	L	\bar{I}_6	I_6
L	H	H	H	\bar{I}_7	I_7

H = HIGH Voltage Level
L = LOW Voltage Level

HC153

Select Inputs		Inputs (a or b)					Output
S_0	S_1	\bar{E}	I_0	I_1	I_2	I_3	Z
X	X	H	X	X	X	X	L
L	L	L	L	X	X	X	L
L	L	L	H	X	X	X	H
H	L	L	X	L	X	X	L
H	L	L	X	H	X	X	H
L	H	L	X	X	L	X	L
L	H	L	X	X	H	X	H
H	H	L	X	X	X	L	L
H	H	L	X	X	X	H	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

HC251

Inputs				Outputs	
OE	S_2	S_1	S_0	\bar{Z}	Z
H	X	X	X	Z	Z
L	L	L	L	\bar{I}_0	I_0
L	L	L	H	\bar{I}_1	I_1
L	L	H	L	\bar{I}_2	I_2
L	L	H	H	\bar{I}_3	I_3
L	H	L	L	\bar{I}_4	I_4
L	H	L	H	\bar{I}_5	I_5
L	H	H	L	\bar{I}_6	I_6
L	H	H	H	\bar{I}_7	I_7

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
ZZ = High Impedance

HC253

Select Inputs		Data Inputs				Output Enable	Output
S_0	S_1	I_0	I_1	I_2	I_3	OE	Z
X	X	X	X	X	X	H	(Z)
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
H	L	X	L	X	X	L	L
H	L	X	H	X	X	L	H
L	H	X	X	L	X	L	L
L	H	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Address inputs S_0 and S_1 are common to both sections.
H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
(Z) = High Impedance

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