National Semiconductor

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MM54HCT153/MM74HCT153 Dual 4-Input Multiplexer

General Description

This 4-to-1 line multiplexer utilizes advanced silicon-gate CMOS technology. It has the low power consumption of standard CMOS integrated circuits. This device is fully buffered, allowing it to drive 10 LS-TTL loads. Information on the data inputs of each multiplexer is selected by the address on the A and B inputs, and is presented on the Y outputs. Each multiplexer possesses a strobe input which enables it when taken to a low logic level. When a high logic level is applied to a strobe input, the output of its associated multiplexer is taken low.

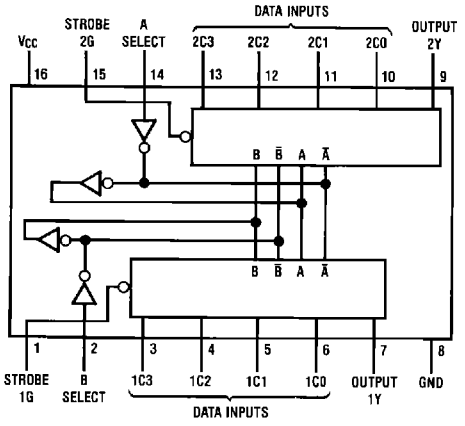
The 54HC/74HC logic family is functionally and pinout compatible with the standard 54LS/74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

Features

- Typical propagation delay: 24 ns
- Low quiescent current: 80 μA maximum (74HCT Series)
- Low input current: 1 μA maximum
- Fanout of 10 LS-TTL loads
- TTL Input Compatible

Connection Diagram

Dual-in-Line Package



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Top View

Order Number MM54HCT153 or MM74HCT153

Truth Table

Select Inputs		Data Inputs				Strobe	Output
B	A	C0	C1	C2	C3	G	Y
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Select inputs A and B are common to both sections.

H = high level, L = low level, X = don't care.

Absolute Maximum Ratings (Notes 1 and 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Input Voltage (V_{IN})	−1.5V to V_{CC} +1.5V
DC Output Voltage (V_{OUT})	−0.5V to V_{CC} +0.5V
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA
DC Output Current, per Pin (I_{OUT})	±25 mA
DC V_{CC} or GND Current, per Pin (I_{CC})	±50 mA
Storage Temperature Range (T_{STG})	−65°C to +150 °C
Power Dissipation (P_D)	
(Note 3)	600 mW
S.O. Package only	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
DC Input or Output Voltage			
(V_{IN}, V_{OUT})	0	V_{CC}	V
Operating Temp. Range (T_A)			
MM74HCT	−40	+85	°C
MM54HCT	−55	+125	°C
Input Rise or Fall Times			
(t_r, t_f)		500	ns

DC Electrical Characteristics V_{CC} = 5V ±10% unless otherwise specified

Symbol	Parameter	Conditions	T_A = 25°C	74HCT T_A = −40°C to 85°C	54HCT T_A = −55°C to 125°C	Units
			Typ	Guaranteed Limits		
V_{IH}	Minimum High Level Input Voltage			2.0	2.0	2.0	V
V_{IL}	Maximum Low Level Input Voltage			0.8	0.8	0.8	V
V_{OH}	Minimum High Level Output Voltage	V_{IN} = V_{IH} or V_{IL}					
		$\|I_{OUT}\|$ = 20 μA	V_{CC}	V_{CC} −0.1	V_{CC} −0.1	V_{CC} −0.1	V
		$\|I_{OUT}\|$ = 4.0 mA, V_{CC} = 4.5V	4.2	3.98	3.84	3.7	V
		$\|I_{OUT}\|$ = 4.8 mA, V_{CC} = 5.5V	5.2	4.98	4.84	4.7	V
V_{OL}	Minimum Low Level Voltage	V_{IN} = V_{IH} or V_{IL}					
		$\|I_{OUT}\|$ = 20 μA	0	0.1	0.1	0.1	V
		$\|I_{OUT}\|$ = 4.0 mA, V_{CC} = 4.5V	0.2	0.26	0.33	0.4	V
		$\|I_{OUT}\|$ = 4.8 mA, V_{CC} = 5.5V	0.2	0.26	0.33	0.4	V
I_{IN}	Maximum Input Current	V_{IN} = V_{CC} or GND, V_{IH} or V_{IL}		±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND I_{OUT} = 0 μA		8	80	160	μA
		V_{IN} = 2.4V or 0.5V (Note 4)		0.6	0.8	1.0	mA

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power dissipation temperature derating—plastic "N" package: −12 mW/°C from 65°C to 85°C; ceramic "J" package: −12 mW/°C from 100°C to 125°C.

Note 4: Measured per pin, all other inputs held at V_{CC} or GND.

AC Electrical Characteristics V_{CC} = 5V, T_A = 25°C, $t_r = t_f$ = 6 ns, C_L = 15 pF

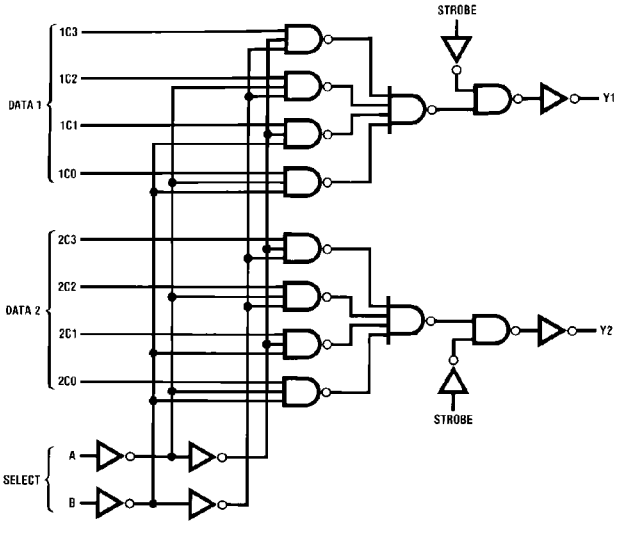
Symbol	Parameter	Conditions	Typ	Units
t_{PHL}, t_{PLH}	Maximum Propagation Delay, Select A or B to Y		23	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay, any Data to Y		20	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay, Strobe to Y		12	ns

AC Electrical Characteristics C_L = 50 pF, $t_r = t_f$ = 6 ns (unless otherwise specified)

Symbol	Parameter	Conditions	T_A = 25°C			74HC T_A = −40°C to 85°C		54HC T_A = −55°C to 125°C		Units
			Min	Typ	Max	Min	Max	Min	Max	
t_{PHL}, t_{PLH}	Maximum Propagation Delay, Select A or B to Y			26	40		50		60	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay, any Data to Y			24	35		44		53	ns
t_{PZH}, t_{PZL}	Maximum Output Enable Time	R_L = 1 kΩ		19	26		33		39	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay, Strobe to Y			15	22		28		33	ns
t_{TLH}, t_{THL}	Maximum Output Rise and Fall Time			8	15		19		22	ns
C_{IN}	Maximum Input Capacitance			5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance	(Note 5)(per package) Outputs Enabled Outputs Disabled		 90 25						 pF pF

Note 5: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Logic Diagram



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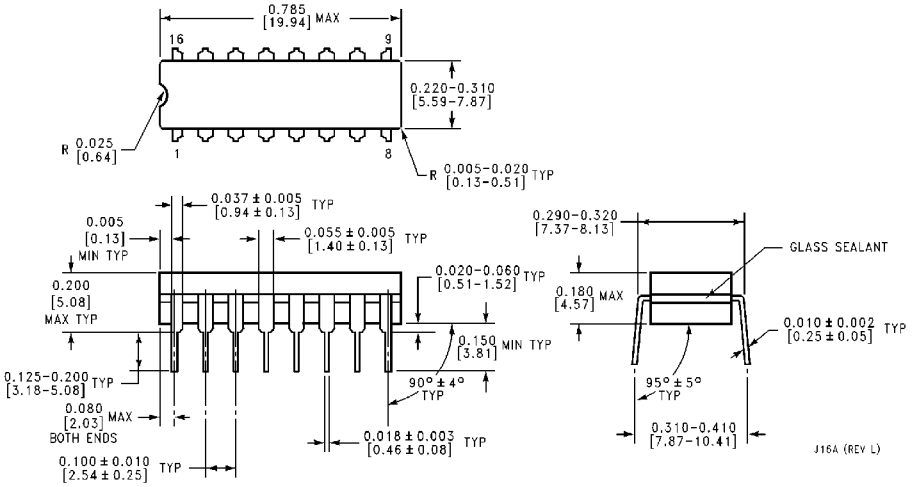
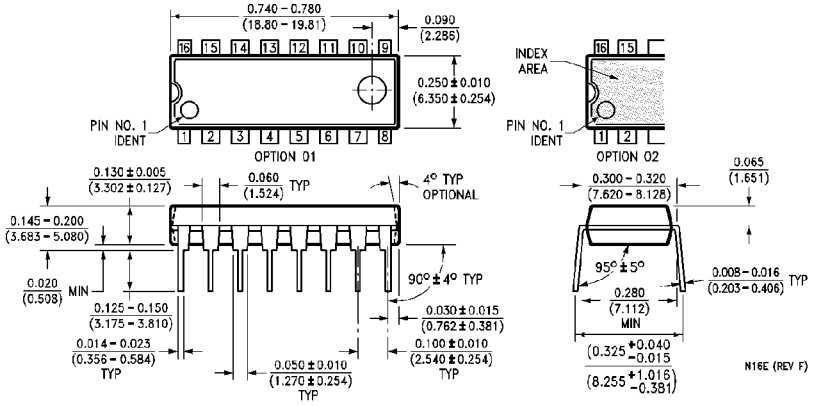
Physical Dimensions inches (millimeters)



Order Number MM54HCT153J or MM74HCT153J
NS Package Number J16A



Order Number MM74HCT153N
NS Package Number N16E

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