National Semiconductor

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MM54HCT151/MM74HCT151 8-Channel Digital Multiplexer

General Description

This high speed Digital multiplexer utilizes advanced silicon-gate CMOS technology. Along with the high noise immunity and low power dissipation of standard CMOS integrated circuits, it possesses the ability to drive 10 LS-TTL loads. The MM54HCT151/MM74HCT151 selects one of the 8 data sources, depending on the address presented on the A, B, and C inputs. It features both true (Y) and complement (W) outputs. The STROBE input must be at a low logic level to enable this multiplexer. A high logic level at the STROBE forces the W output high and the Y output low.

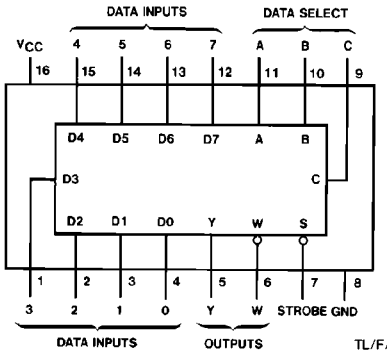
MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

Features

- Typical propagation delay: 20 ns
- Low quiescent supply current: 40 μA maximum (74HCT Series)
- Low input current: 1 μA maximum
- Fanout of 10 LS-TTL loads
- TTL input compatible

Connection and Logic Diagrams

Dual-In-Line Package



TL/F/9399–1

Top View

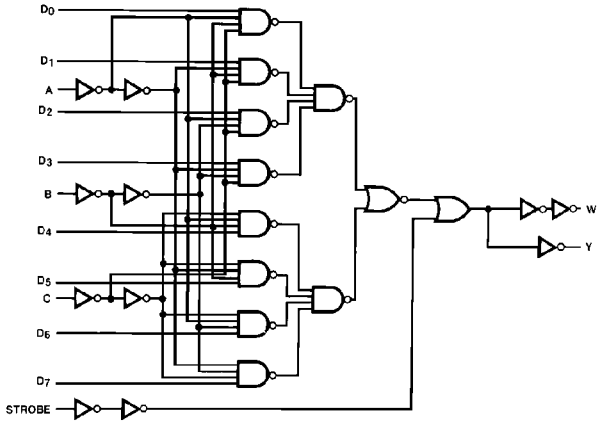
Order Number MM54HCT151 or MM74HCT151

Truth Table

Inputs				Outputs	
Select			Strobe		
C	B	A	S	Y	W
X	X	X	H	L	H
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	$\overline{D7}$

H = High Level, L = Low Level, X = Don't Care

D0, D1...D7 = the level of the respective D input



TL/F/9399–2

RRD-B30M115/Printed in U. S. A.

Absolute Maximum Ratings (Notes 1 & 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 (Note 4)

Symbol	Parameter	Conditions	V_{CC}	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}						
		$\|I_{OUT}\| \leq 20\ \mu A$	4.5V		4.4	4.4	4.4	V
		V_{IN} = V_{IH} or V_{IL}						
		$\|I_{OUT}\| \leq 4.0$ mA	4.5V	4.2	3.98	3.84	3.7	V
		$\|I_{OUT}\| \leq 4.8$ mA	5.5V	5.2	4.98	4.84	4.7	V
V_{OL}	Maximum Low Level Output Voltage	V_{IN} = V_{IH} or V_{IL}						
		$\|I_{OUT}\| = 20\ \mu A$		0	0.1	0.1	0.1	V
		$\|I_{OUT}\| = 4.0$ mA	4.5V	0.2	0.26	0.33	0.4	V
		$\|I_{OUT}\| = 4.8$ mA	5.5V	0.2	0.26	0.33	0.4	V
I_{IN}	Maximum Input Current	V_{IN} = V_{CC} or GND	6.0V		±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND						
		I_{OUT} = 0 μA			8.0	80	160	μA
		V_{IN} = 2.4V or 0.5V (Note 4)		0.25	0.4	0.55	0.65	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: For a power supply of 5V ±10% the worst case output voltages (V_{OH}, and V_{OL}) occur for HCT at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at V_{CC} = 5.5V and 4.5V respectively. (The V_{IH} value at 5.5V is 3.85V.) The worst case leakage current (I_{IN}, I_{CC}, and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0V values should be used.

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

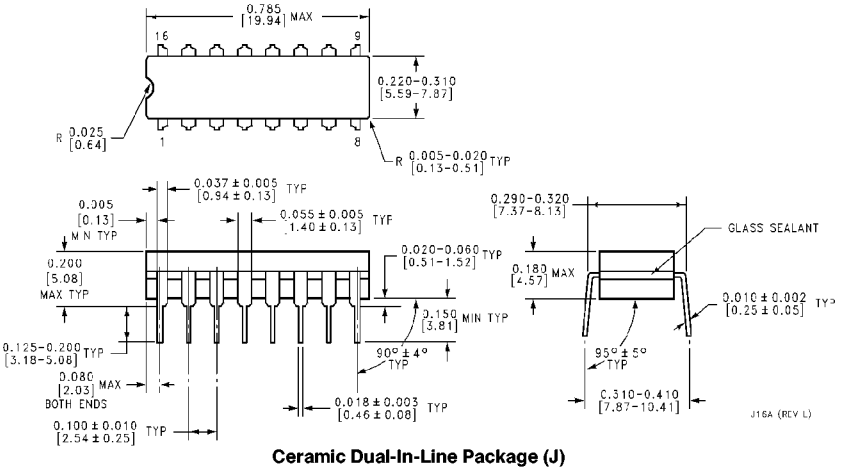
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PHL}, t_{PLH}	Maximum Propagation Delay A, B or C to Y		26	35	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay A, B or C to W		26	35	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay Any D to Y		22	29	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay any D to W		22	29	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay Strobe to Y		17	23	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay Strobe to W		17	23	ns

AC Electrical Characteristics V_{CC} = 5.0V ±10%, $C_L=50$ pF, $t_r=t_f=6$ ns (unless otherwise specified)

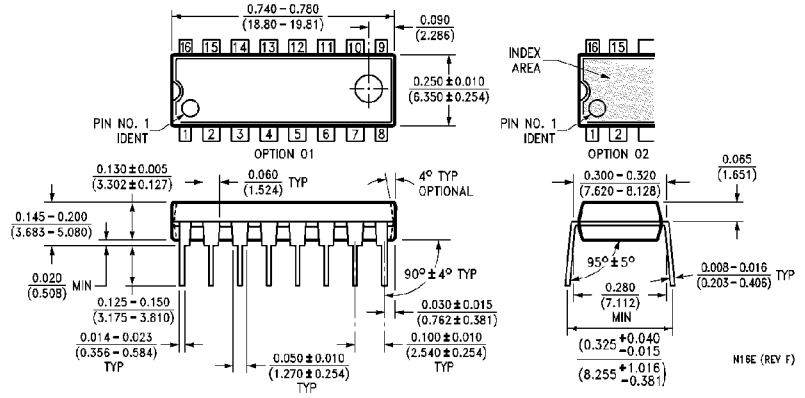
Symbol	Parameter	Conditions	$T_A=25°C$	74HCT $T_A=-40°C$ to $+85°C$		54HCT $T_A=-55°C$ to $+125°C$	Units
			Typ	Guaranteed Limits			
t_{PHL}, t_{PLH}	Maximum Propagation Delay A, B or C to Y		33	46	58	69	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay A, B or C to W		33	46	58	69	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay any D to Y		27	39	49	59	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay any D to W		27	39	49	59	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay Strobe to Y		21	28	35	42	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay Strobe to W		21	28	35	42	ns
t_{TLH}, t_{THL}	Maximum Output Rise and Fall Time		8	15	19	23	ns
C_{PD}	Power Dissipation Capacitance (Note 5)	(per package)	110				pF
C_{IN}	Maximum Input Capacitance		5	10			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, $I_S=C_{PD}\,V_{CC}\,f+I_{CC}$.

Physical Dimensions inches, (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number MM54HCT151J or MM74HCT151J
NS Package Number J16A



Molded Dual-In-Line Package (N)
Order Number MM74HCT151N
NS Package Number N16E

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