

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.

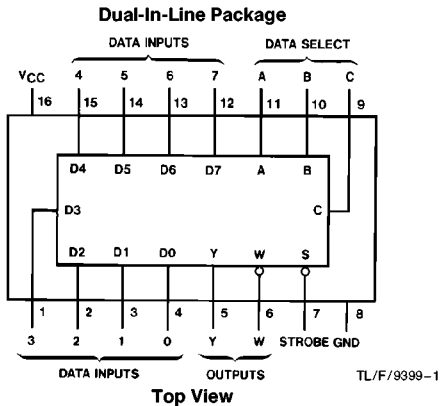
MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS

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 μ A maximum (74HCT Series)
- Low input current: 1 μ A maximum
- Fanout of 10 LS-TTL loads
- TTL input compatible

Connection and Logic Diagrams

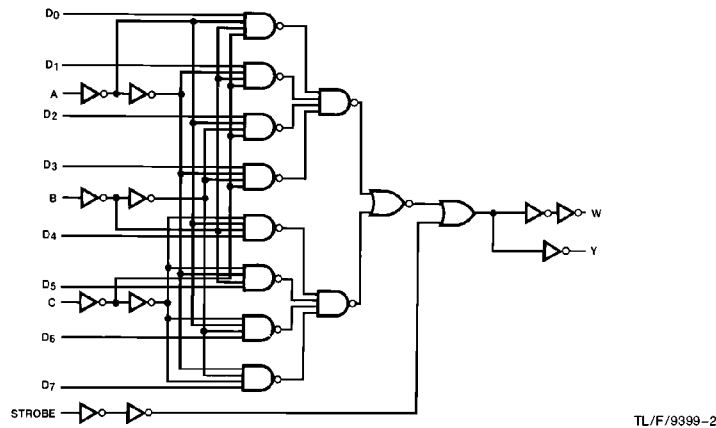


Truth Table

Inputs			Outputs		
Select			Strobe S	Y	W
C	B	A			
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

Order Number MM54HCT151 or MM74HCT151



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}	$T_A = 25^\circ\text{C}$			Units
				Typ	74HCT $T_A = -40^\circ\text{C to } +85^\circ\text{C}$	54HCT $T_A = -55^\circ\text{C to } +125^\circ\text{C}$	
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\text{A}$	4.5V	4.4	4.4	4.4	V
		$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 4.0 \text{ mA}$	4.5V	4.2	3.98	3.7	V
		$ I_{OUT} \leq 4.8 \text{ mA}$	5.5V	5.2	4.98	4.7	V
V_{OL}	Maximum Low Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} = 20 \mu\text{A}$		0	0.1	0.1	V
		$ I_{OUT} = 4.0 \text{ mA}$	4.5V	0.2	0.26	0.33	V
		$ I_{OUT} = 4.8 \text{ mA}$	5.5V	0.2	0.26	0.33	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 $I_{OUT} = 0 \mu\text{A}$		8.0	80	160	μA
		$V_{IN} = 2.4\text{V}$ or 0.5V (Note 4)		0.25	0.4	0.55	0.65

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 $\pm 10\%$ 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 $V_{CC} = 5V$, $T_A = 25^\circ C$, $C_L = 15\text{ pF}$, $t_r = t_f = 6\text{ ns}$

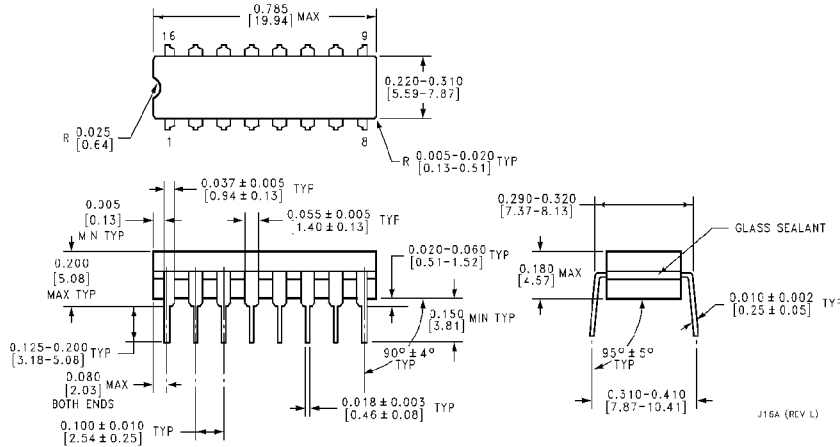
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PHL} , t_{PLH}	Maximum Propagation Delay A, B or C to Y		26	35	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay A, B or C to W		26	35	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay Any D to Y		22	29	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay 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 $V_{CC} = 5.0V \pm 10\%$, $C_L = 50\text{ pF}$, $t_r = t_f = 6\text{ ns}$ (unless otherwise specified)

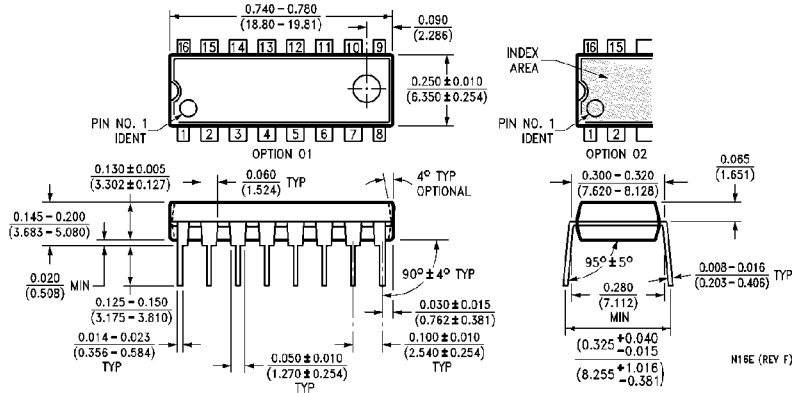
Symbol	Parameter	Conditions	$T_A = 25^\circ C$		74HCT	54HCT	Units
			Typ	Guaranteed Limits		$T_A = -40^\circ C \text{ to } +85^\circ C$	
t_{PHL} , t_{PLH}	Maximum Propagation Delay A, B or C to Y		33	46	58	69	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay A, B or C to W		33	46	58	69	ns
t_{PHL} , t_{PLH}	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

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
 1111 West Bardin Road
 Arlington, TX 76017
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018

National Semiconductor Europe
 Fax: (+49) 0-180-530 85 86
 Email: onjwge@tevm2.nsc.com
 Deutsch Tel: (+49) 0-180-530 85 85
 English Tel: (+49) 0-180-532 78 32
 Français Tel: (+49) 0-180-532 93 58
 Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
 13th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: (852) 2737-1600
 Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
 Tel: 81-043-299-2309
 Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.