

MM54HCT139/MM74HCT139 Dual 2-To-4 Line Decoder

General Description

The MM54HCT139/MM74HCT139 is a high speed silicon-gate CMOS decoder that is well suited to memory address decoding or data routing applications. It possesses an input threshold and output drive similar to LS-TTL and the low standby power of CMOS logic.

The device is comprised of two independent one-of-four decoders each with a single active low enable input (G1 or G2). Data on the select inputs (A1, B1 or A2, B2) cause one of the four normally high outputs to go low.

All inputs to the decoder are protected from damage due to electrostatic discharge by diodes to V_{CC} and ground. The

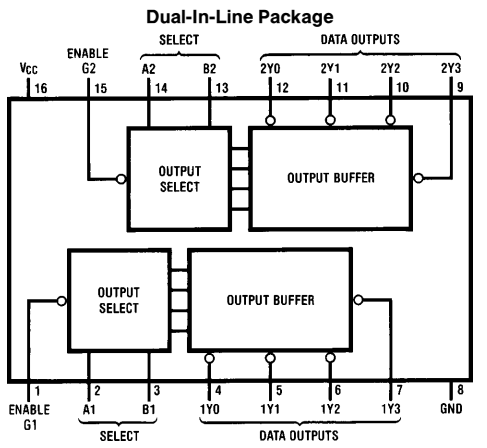
device is capable of driving 10 low power Schottky TTL equivalent loads.

The MM54HCT139/MM74HCT139 is functionally and pin equivalent to the 54LS139/74LS139 and can be used as a plug-in replacement to reduce system power consumption in existing systems.

Features

- Typical propagation delays: 20 ns
- Low quiescent current: 40 μA maximum (74HCT Series)
- Fanout of 10 LS-TTL loads

Connection Diagram



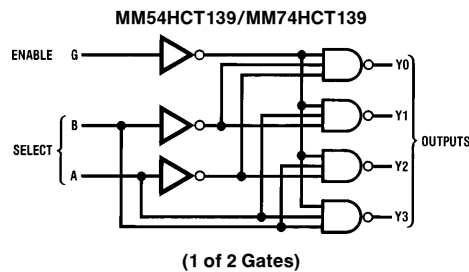
Top View
Order Number MM54HCT139 or MM74HCT139

Truth Table

Inputs			Outputs			
Enable	Select		Y0	Y1	Y2	Y3
G	B	A				
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	L	L

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

Logic Diagram



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})	-0.5 to +7.0V
DC Input Voltage (V_{IN})	-1.5 to $V_{CC} + 1.5V$
DC Output Voltage (V_{OUT})	-0.5 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 Temp. (T_L)	
(Soldering 10 seconds)	300°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/Fall Time (t_r, t_f)		500	ns

DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	V_{CC}	Typ	Guaranteed Limits		Units		
				T = 25°C	T = 25°C	74HCT T = -40 to 85°C		54HCT T = -55 to 125°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} = 20 \mu A$ $ I_{OUT} = 4.0 \text{ mA}, V_{CC} = 4.5V$ $ I_{OUT} = 4.8 \text{ mA}, V_{CC} = 5.5V$	V_{CC}	$V_{CC} - .1$	$V_{CC} - .1$	$V_{CC} - .1$		V	
				3.98	3.84	3.7	V		
				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$ $ I_{OUT} = 4.0 \text{ mA}, V_{CC} = 4.5V$ $ I_{OUT} = 4.8 \text{ mA}, V_{CC} = 5.5V$			0.10	0.10	0.1	V	
					0.26	0.33	0.4	V	
					0.26	0.33	0.4	V	
I_{IN}	Maximum Input Current	$V_{IN} = V_{CC}$ or GND $V_{IN} = V_{IH}$ or V_{IL}			± 0.1	± 1.0	± 1.0	μA	
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu A$ (Note 4)				4	40	80	μA
						0.3	0.4	0.5	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 input, other inputs at V_{CC} or GND.

AC Electrical Characteristics (V_{CC}, temperature and loading of LS-TTL)

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

Symbol	Parameter	Conditions	Typ	Guaranteed Limits	Units
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Binary Select to any Output		18	30	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Enable to any Output		18	30	ns

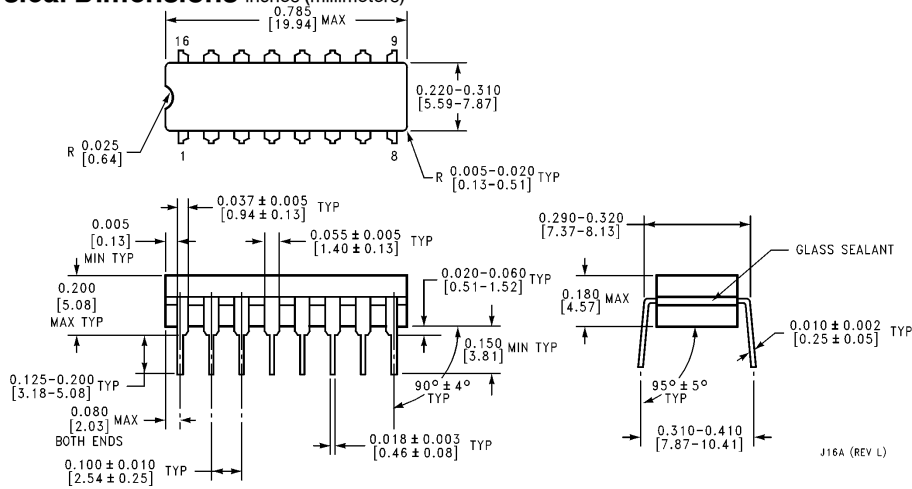
AC Electrical Characteristics

(Full range of V_{CC} and temperature) V_{CC}=5V ± 10%, C_L=50 pF (unless otherwise specified)

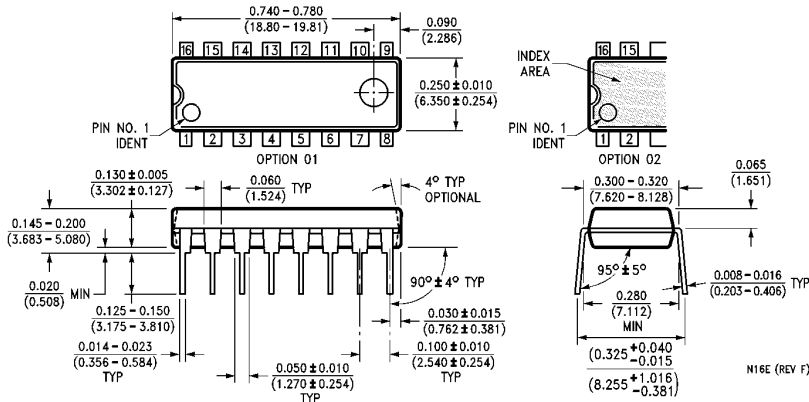
Symbol	Parameter	Conditions	Typ		Guaranteed Limits		Units
			T _A =25°C	T _A =25°C	74HCT T _A = -40 to 85°C	54HCT T _A = -55 to 125°C	
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Binary Select to any Output		20	35	44	51	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Enable to any Output		21	35	44	51	ns
t _{TLH} , t _{THL}	Maximum Output Rise and Fall Time		9	15	19	22	ns
C _{PD}	Power Dissipation Capacitance	Note 5	36				pF
C _{IN}	Minimum Input Capacitance		5	10	10	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)



**Order Number MM54HCT139J or MM74HCT139J
NS Package J16A**



**Order Number MM74HCT139N
NS Package N16E**

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