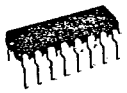
T-67-21-55

LC74HC139



30068

CMOS High-Speed Standard Logic
LC74HC Series

Dual 2 to 4-Line Decoder

Features

- The LC74HC139 consists of 2 identical 2-to-4 decoders.
- Uses CMOS silicon gate process technology to achieve operating speeds similar to LS-TTL (74LS139) with the low power dissipation and high noise margin of standard CMOS IC's.
- Has buffered outputs, improving the output transition characteristics.
- All inputs and outputs are protected from damage.
- The LC74HC139 is functionally as well as pin-out compatible with the standard 54LS/74 LS TTL logic family.

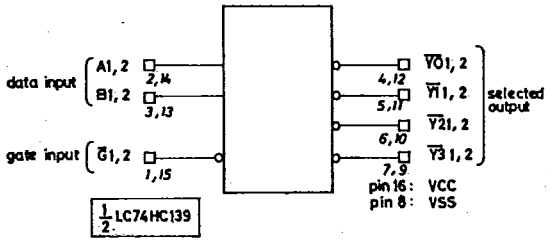
Absolute Maximum Ratings/T_a=25±2°C, V_{SS}=0V

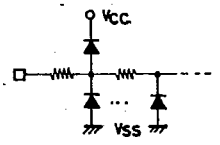
				unit
Maximum Supply Voltage	V_{CC} max	V_{SS}–0.5 to V_{SS}+7.0		V
Maximum Input Voltage	V_{IN} max	V_{SS}–0.5 to V_{CC}+0.5		V
Maximum Output Voltage	V_{OUT} max	V_{SS}–0.5 to V_{CC}+0.5		V
Maximum Output Current	I_{OUT}	Per output	±25	mA
Current Dissipation	I_{CC}/I_{Gnd}		±50	mA
Clamp Diode Current	I_K	Per input pin (Input protector)	±20	mA
Allowable Power Dissipation	P_d max	Per package, $T_a \leq 85°C$	300	mW
Storage Temperature	T_{stg}		–65 to +150	°C
Lead Temperature and Time	T_{sol}	t=10sec	300	°C

Allowable Operating Conditions/V_{SS}=0V

			unit
Supply Voltage	V_{CC}	2.0 to 6.0	V
Input Voltage	V_{IN}	0 to V_{CC}	V
Output Voltage	V_{OUT}	0 to V_{CC}	V
Operating Temperature	T_{opg}	–40 to +85	°C
Input Rise/Fall Time	tr, tf	0 to 500	ns

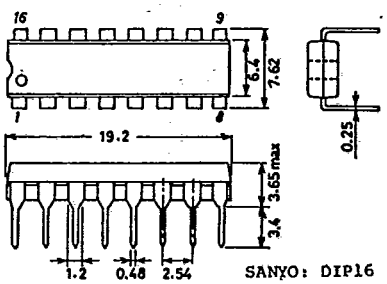
Equivalent Circuit and Logic Diagram





Input Protection Circuit

Case Outline 3006B-D16IC
(unit: mm)



Truth Table

$\overline{G}$	B	A	selected output
0	0	0	$\overline{Y0}$
0	0	1	$\overline{Y1}$
0	1	0	$\overline{Y2}$
0	1	1	$\overline{Y3}$
1	×	×	all outputs=1

'1':'H'level
'0':'L'level

×:don't care

Electrical Characteristics/T_a=25±2°C, V_{SS}=0V

			Vcc	min	typ	max	unit
Input 'H'-Level Voltage	V_{IH}		2.0	1.5			V
			4.5	3.15			V
			5.0	3.5			V
			5.5	3.85			V
			6.0	4.2			V
Input 'L'-Level Voltage	V_{IL}		2.0			0.6	V
			4.5			1.35	V
			5.0			1.5	V
			5.5			1.65	V
			6.0			1.8	V
Output 'H'-Level Voltage	V_{OH}	V_{IN}=V_{IH} or V_{IL}, I_{OH}=-20uA	4.5	4.4	4.5		V
			5.0	4.9	5.0		V
			5.5	5.4	5.5		V
		V_{IN}=V_{IH} or V_{IL}, I_{OH}=-4mA	4.5	4.1	4.3		V
			5.0	4.6	4.8		V
			5.5	5.1	5.3		V
Output 'L'-Level Voltage	V_{OL}	V_{IN}=V_{IH} or V_{IL}, I_{OL}=20uA	4.5		0.0	0.1	V
			5.0		0.0	0.1	V
			5.5		0.0	0.1	V
		V_{IN}=V_{IH} or V_{IL}, I_{OL}=4mA	4.5		0.2	0.4	V
			5.0		0.2	0.4	V
			5.5		0.2	0.4	V
Input Current	I_{IN}	V_{IN}=Vcc or Vss	6.0			±0.1	μA
Quiescent Current	I_{CC}	V_{IN}=Vcc or Vss, output open	6.0			1.0	μA

Electrical Characteristics/T_a=−40°C, V_{SS}=0V

			Vcc	min	typ	max	unit
Input 'H'-Level Voltage	V_{IH}		2.0	1.5			V
			4.5	3.15			V
			5.0	3.5			V
			5.5	3.85			V
			6.0	4.2			V
Input 'L'-Level Voltage	V_{IL}		2.0			0.6	V
			4.5			1.35	V
			5.0			1.5	V
			5.5			1.65	V
			6.0			1.8	V
Output 'H'-Level Voltage	V_{OH}	V_{IN}=V_{IH} or V_{IL}, I_{OH}=-20uA	4.5	4.4			V
			5.0	4.9			V
			5.5	5.4			V
		V_{IN}=V_{IH} or V_{IL}, I_{OH}=-4mA	4.5	4.1			V
			5.0	4.6			V
			5.5	5.1			V

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			Vcc	min	typ	max	unit
Output 'L'-Level Voltage	VOL	VIN=VIH or VIL, IOL=20uA	4.5			0.1	V
			5.0			0.1	V
			5.5			0.1	V
		VIN=VIH or VIL, IOL=4mA	4.5			0.4	V
			5.0			0.4	V
			5.5			0.4	V
Input Current	IIN	VIN=VCC or VSS	6.0			±0.1	μA
Quiescent Current	ICC	VIN=VCC or VSS, output open	6.0			1.0	μA

Electrical Characteristics/T_a=+85°C, V_{SS}=0V

			Vcc	min	typ	max	unit
Input 'H'-Level Voltage	VIH		2.0	1.5			V
			4.5	3.15			V
			5.0	3.5			V
			5.5	3.85			V
			6.0	4.2			V
Input 'L'-Level Voltage	VIL		2.0			0.6	V
			4.5			1.35	V
			5.0			1.5	V
			5.5			1.65	V
			6.0			1.8	V
Output 'H'-Level Voltage	VOH	VIN=VIH or VIL, IOH=-20uA	4.5	4.4			V
			5.0	4.9			V
			5.5	5.4			V
		VIN=VIH or VIL, IOH=-4mA	4.5	4.0			V
			5.0	4.5			V
			5.5	5.0			V
Output 'L'-Level Voltage	VOL	VIN=VIH or VIL, IOL=20uA	4.5			0.1	V
			5.0			0.1	V
			5.5			0.1	V
		VIN=VIH or VIL, IOL=4mA	4.5			0.5	V
			5.0			0.5	V
			5.5			0.5	V
Input Current	IIN	VIN=VCC or VSS	6.0			±1.0	μA
Quiescent Current	ICC	VIN=VCC or VSS, output open	6.0			10.0	μA

Switching Characteristics/T_a=25±2°C, V_{SS}=0V, input: t_r, t_f=6ns

				Vcc	min	typ	max	unit
Output Rise Time		tTLH	CL=15pF	5.0		4	8	ns
Output Fall Time		tTHL	〃	5.0		4	8	ns
'H'-Level Propagation Delay Time	(A,B-$\overline{Y}$)	tPLH	〃	5.0		15	25	ns
'L'-Level Propagation Delay Time		tPHL	〃	5.0		15	25	ns
'H'-Level Propagation Delay Time	($\overline{G}$-$\overline{Y}$)	tPLH	〃	5.0		15	25	ns
'L'-Level Propagation Delay Time		tPHL	〃	5.0		15	25	ns
Output Rise Time		tTLH	CL=50pF	5.0		8	15	ns
Output Fall Time		tTHL	〃	5.0		8	15	ns
'H'-Level Propagation Delay Time	(A,B-$\overline{Y}$)	tPLH	〃	5.0		20	30	ns
'L'-Level Propagation Delay Time		tPHL	〃	5.0		20	30	ns
'H'-Level Propagation Delay Time	($\overline{G}$-$\overline{Y}$)	tPLH	〃	5.0		20	30	ns
'L'-Level Propagation Delay Time		tPHL	〃	5.0		20	30	ns
Input Capacitance		cin						

Switching Waveforms