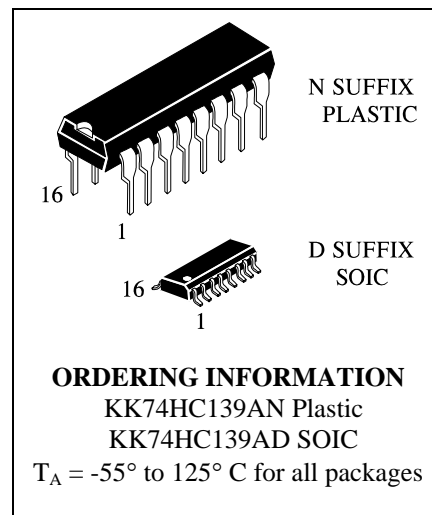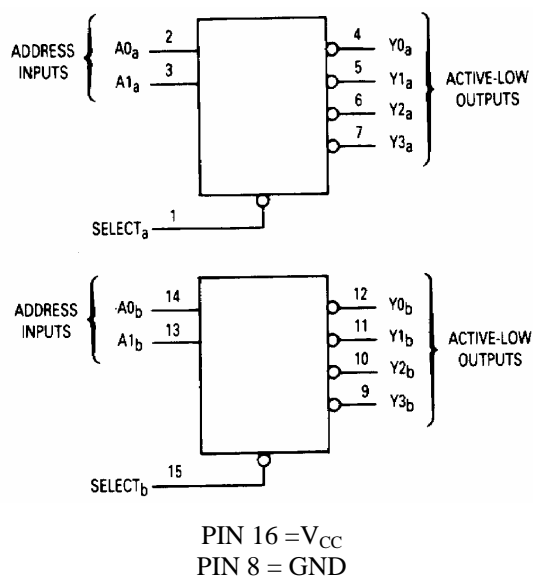**KK74HC139A**

Dual 1-of-4 Decoder/Demultiplexer

The KK74HC139A is identical in pinout to the LS/ALS139. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LS/ALSTTL outputs.

This device consists of two independent 1-of-4 decoders, each of which decodes a two-bit Address to one-of-four active-low outputs. Active-low Selects are provided to facilitate the demultiplexing and cascading functions. The demultiplexing function is accomplished by using the Address inputs to select the desired device output, and utilizing the Select as a data input.

- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μA
- High Noise Immunity Characteristic of CMOS Devices

N SUFFIX
PLASTIC

D SUFFIX
SOIC

ORDERING INFORMATION
KK74HC139AN Plastic
KK74HC139AD SOIC
T_A = -55° to 125° C for all packages

LOGIC DIAGRAM

PIN 16 = V_{CC}
PIN 8 = GND

PIN ASSIGNMENT

Pin		Pin	
SELECT$_a$	1	16	V$_{CC}$
A0$_a$	2	15	SELECT$_b$
A1$_a$	3	14	A0$_b$
Y0$_a$	4	13	A1$_b$
Y1$_a$	5	12	Y0$_b$
Y2$_a$	6	11	Y1$_b$
Y3$_a$	7	10	Y2$_b$
GND	8	9	Y3$_b$

FUNCTION TABLE

Inputs			Outputs			
Select	A1	A0	Y0	Y1	Y2	Y3
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	H	L

X = don't care

MAXIMUM RATINGS[*]

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V_{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V_{CC} +1.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±20	mA
I_{OUT}	DC Output Current, per Pin	±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±50	mA
P_D	Power Dissipation in Still Air, Plastic DIP[**] SOIC Package[**]	750 500	mW
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

[*] Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.
[**]Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
         SOIC Package: - 7 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)		2.0	6.0	V
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)		0	V_{CC}	V
T_A	Operating Temperature, All Package Types		-55	+125	°C
t_r, t_f	Input Rise and Fall Time (Figure 1)	V_{CC} =2.0 V V_{CC} =4.5 V V_{CC} =6.0 V	0 0 0	1000 500 400	ns

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

## DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit 25 °C to -55°C	≤85 °C	≤125 °C	Unit
V_{IH}	Minimum High-Level Input Voltage	V_{OUT}=0.1 V or V_{CC}-0.1 V, $\|I_{OUT}\| \leq 20\ \mu A$	2.0 4.5 6.0	1.5 3.15 4.2	1.5 3.15 4.2	1.5 3.15 4.2	V
V_{IL}	Maximum Low - Level Input Voltage	V_{OUT}=0.1 V or V_{CC}-0.1 V, $\|I_{OUT}\| \leq 20\ \mu A$	2.0 4.5 6.0	0.5 1.35 1.8	0.5 1.35 1.8	0.5 1.35 1.8	V
V_{OH}	Minimum High-Level Output Voltage	V_{IN}=V_{IH} or V_{IL}, $\|I_{OUT}\| \leq 20\ \mu A$	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		V_{IN}=V_{IH} or V_{IL}, $\|I_{OUT}\| \leq 4.0$ mA, $\|I_{OUT}\| \leq 5.2$ mA	4.5 6.0	3.98 5.48	3.84 5.34	3.7 5.2	
V_{OL}	Maximum Low-Level Output Voltage	V_{IN}=V_{IH} or V_{IL}, $\|I_{OUT}\| \leq 20\ \mu A$	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		V_{IN}=V_{IH} or V_{IL}, $\|I_{OUT}\| \leq 4.0$ mA, $\|I_{OUT}\| \leq 5.2$ mA	4.5 6.0	0.26 0.26	0.33 0.33	0.4 0.4	
I_{IN}	Maximum Input Leakage Current	V_{IN}=V_{CC} or GND	6.0	±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	V_{IN}=V_{CC} or GND, I_{OUT}=0μA	6.0	4.0	40	160	μA

AC ELECTRICAL CHARACTERISTICS (C_L=50pF,Input t_r=t_f=6.0 ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			25 °C to -55°C	≤85°C	≤125°C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Select to OutputY (Figures 1 and 3)	2.0 4.5 6.0	115 23 20	145 29 25	175 35 30	ns
t_{PLH}, t_{PHL}	Maximum Propagation Delay , Input A to OutputY (Figures 2 and 3)	2.0 4.5 6.0	115 23 20	145 29 25	175 35 30	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 3)	2.0 4.5 6.0	75 15 13	95 19 16	110 22 19	ns
C_{IN}	Maximum Input Capacitance	-	10	10	10	pF

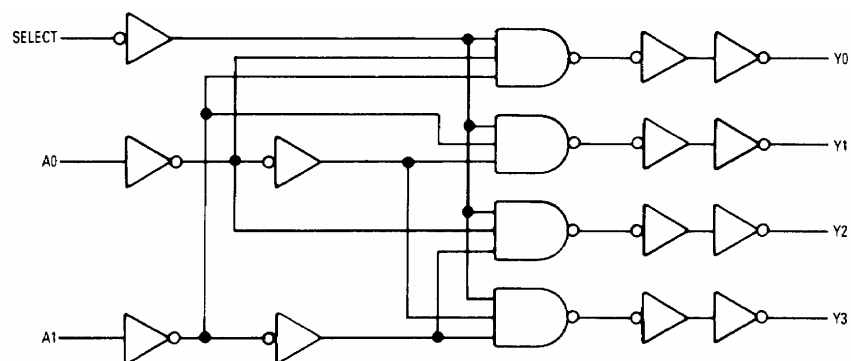| C_{PD}	Power Dissipation Capacitance (Per Decoder) Used to determine the no-load dynamic power consumption: P_D=$C_{PD}V_{CC}^2f$+$I_{CC}V_{CC}$	Typical @25°C,V_{CC}=5.0 V		pF
		55		
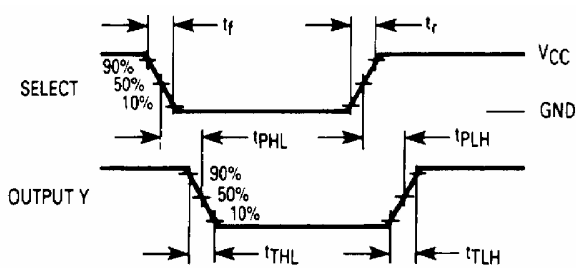
Figure 1. Switching Waveforms
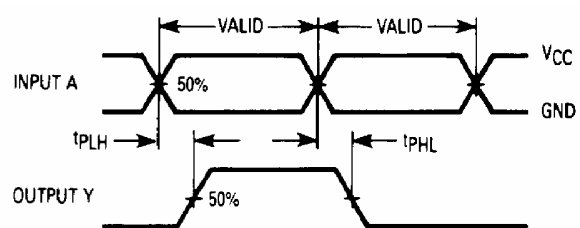
Figure 2. Switching Waveforms

5
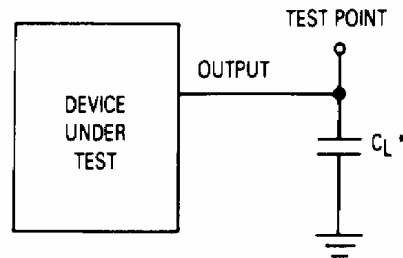
Figure 3. Test Circuit

EXPANDED LOGIC DIAGRAM
(1/2 of Device)

N SUFFIX PLASTIC DIP
(MS - 001BB)

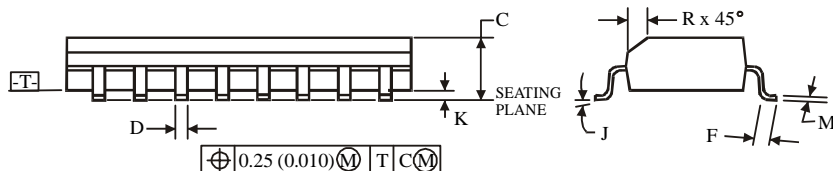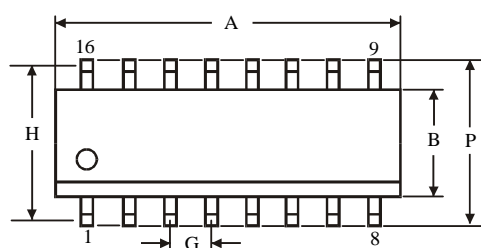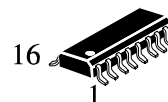|	Dimension, mm	
Symbol	**MIN**	**MAX**
A	18.67	19.69
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	
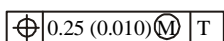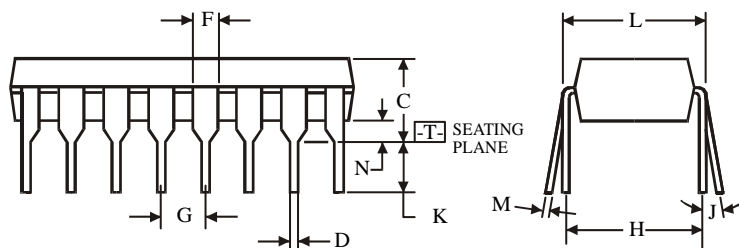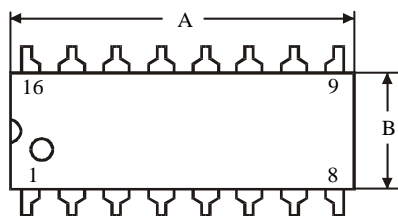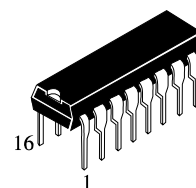
NOTES:

1. Dimensions "A", "B" do not include mold flash or protrusions.

   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AC)

	Dimension, mm	
Symbol	**MIN**	**MAX**
A	9.8	10
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5
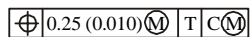
NOTES:

1. Dimensions A and B do not include mold flash or protrusion.

2. Maximum mold flash or protrusion 0.15 mm (0.006) per side
   for A; for B – 0.25 mm (0.010) per side.