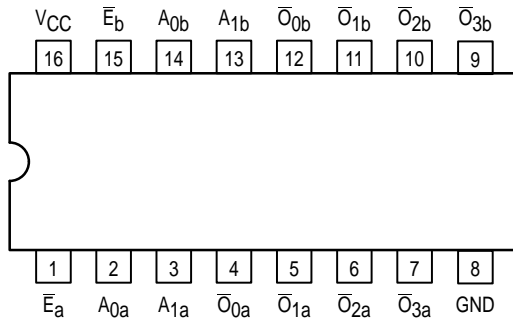


# DUAL 1-OF-4 DECODER

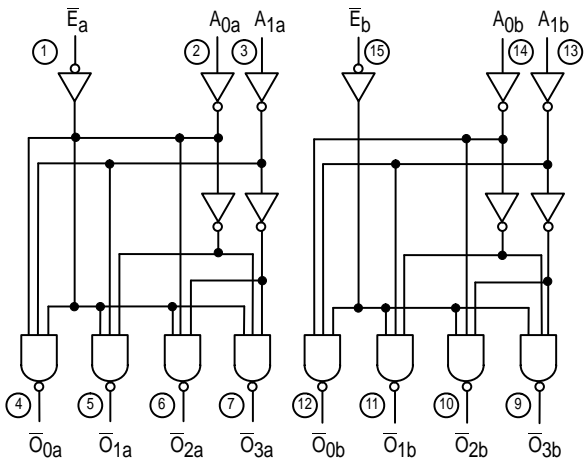
The MC54/74F139 is a high speed Dual 1-of-4 Decoder/Demultiplexer. The device has two independent decoders, each accepting two inputs and providing four mutually exclusive active LOW outputs. Each decoder has an active LOW Enable input which can be used as a data input for a 4-output demultiplexer. Each half of the F139 can be used as a function generator providing all four miniterms of two variables.

- Multifunction Capability
- Two Completely Independent 1-of-4 Decoders
- Active Low Mutually Exclusive Outputs
- Input Clamp Diodes Limit High-Speed Termination Effects

### CONNECTION DIAGRAM



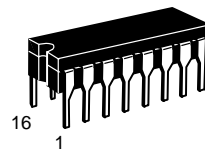
### LOGIC DIAGRAM



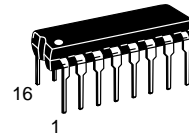
V<sub>CC</sub> = PIN 16  
 GND = PIN 8  
 ○ = PIN NUMBERS

## MC54/74F139

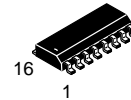
### DUAL 1-OF-4 DECODER FAST™ SHOTTKY TTL



**J SUFFIX**  
 CERAMIC  
 CASE 620-09



**N SUFFIX**  
 PLASTIC  
 CASE 648-08

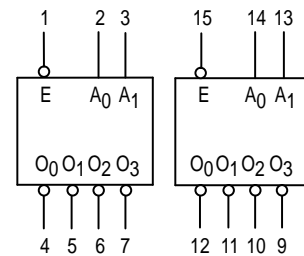


**D SUFFIX**  
 SOIC  
 CASE 751B-03

### ORDERING INFORMATION

MC54FXXXJ	Ceramic
MC74FXXXN	Plastic
MC74FXXXD	SOIC

### LOGIC SYMBOL



V<sub>CC</sub> = Pin 16  
 GND = Pin 8

# MC54/74F139

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54, 74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	54	-55	25	125	°C
		74	0	25	70	
I <sub>OH</sub>	Output Current — High	54, 74			-1.0	mA
I <sub>OL</sub>	Output Current — Low	54, 74			20	mA

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V <sub>IH</sub>	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage
V <sub>IL</sub>	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage
V <sub>IK</sub>	Input Clamp Diode Voltage			-1.2	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54, 74	2.5		V	I <sub>OH</sub> = -1.0 mA, V <sub>CC</sub> = 4.50 V
		74	2.7		V	I <sub>OH</sub> = -1.0 mA, V <sub>CC</sub> = 4.75 V
V <sub>OL</sub>	Output LOW Voltage			0.5	V	I <sub>OL</sub> = 20 mA, V <sub>CC</sub> = MIN
I <sub>IH</sub>	Input HIGH Current			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
				0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current			-0.6	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V
I <sub>OS</sub>	Output Short Circuit Current (Note 2)	-60		-150	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V
I <sub>CC</sub>	Power Supply Current			20	mA	V <sub>CC</sub> = MAX

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
2. Not more than one output should be shorted at a time, nor for more than 1 second.

## AC CHARACTERISTICS

Symbol	Parameter	54/74F		54F		74F		Unit
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0 V C <sub>L</sub> = 50 pF		T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = 5.0 V ±10% C <sub>L</sub> = 50 pF		T <sub>A</sub> = 0°C to 70°C V <sub>CC</sub> = 5.0 V ±10% C <sub>L</sub> = 50 pF		
		Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay, Address to Output	3.5	7.0	2.5	12.0	3.0	8.5	ns
t <sub>PHL</sub>	Address to Output	3.5	8.0	3.5	9.5	3.5	9.0	
t <sub>PLH</sub>	Enable to Output	3.5	7.0	3.0	9.0	3.5	8.0	ns
t <sub>PHL</sub>	Enable to Output	2.5	6.5	2.5	8.0	2.5	7.5	

## FUNCTIONAL DESCRIPTION

The F139 is a high speed dual 1-of-4 decoder/demultiplexer fabricated with the Schottky barrier diode process. The device has two independent decoders, each of which accepts two binary weighted inputs (A<sub>0</sub>, A<sub>1</sub>) and provide four mutually exclusive active LOW outputs ( $\overline{O}_0$ - $\overline{O}_3$ ). Each decoder has an active LOW Enable ( $\overline{E}$ ). When  $\overline{E}$  is HIGH all outputs are forced HIGH. The enable can be used as the data input for a 4-output demultiplexer application.

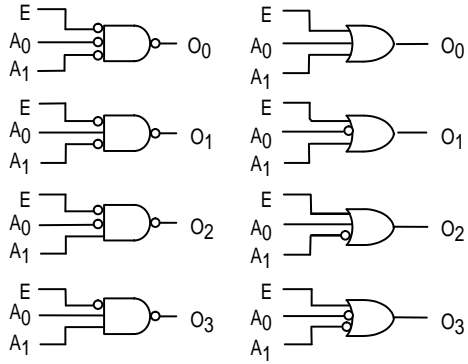
Each half of the F139 generates all four miniterms of two variables. These four miniterms are useful in some applications, replacing multiple gate functions as shown in Figure 1, and thereby reducing the number of packages required in a logic network.

# MC54/74F139

**FUNCTION TABLE**

Inputs			Outputs			
$\bar{E}$	$A_0$	$A_1$	$\bar{O}_0$	$\bar{O}_1$	$\bar{O}_2$	$\bar{O}_3$
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care



**Figure 1.**