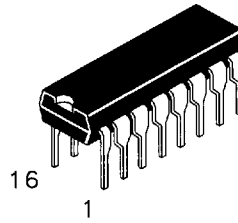


### 1 - of - 8 Decoder/ Demultiplexer

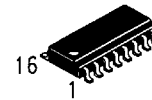
This high-speed 1-of-8 decoder/demultiplexer is ideally suited for high-speed bipolar memory chip select address decoding. The multiple input enables allow parallel expansion to a 1-of-24 decoder using just three 'AC138'/ACT138 devices or a 1-of-3 decoder using four 'AC138'/ACT138 devices and one inverter.

- Advanced very high speed CMOS
- Outputs source/sink 24 mA
- Transmission line driving 50 ohms
- ACT has TTL compatible inputs
- Operation from 2 to 6 volts guaranteed
- DC & AC Parameters guaranteed over -40 to +85°C

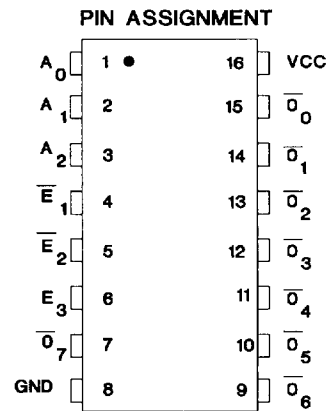
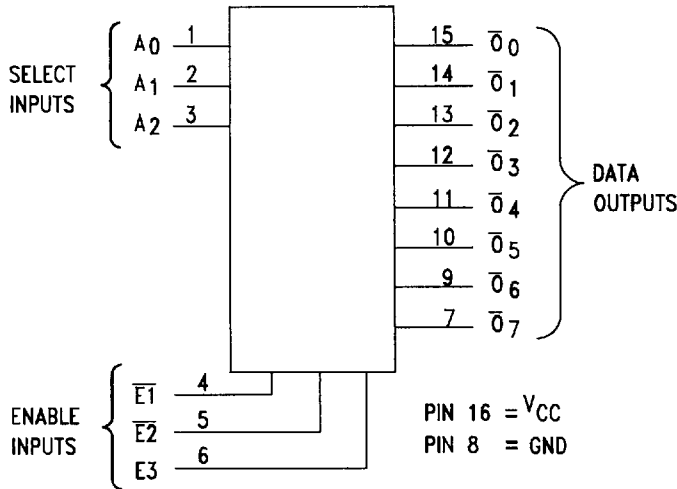
### DV74AC138 DV74ACT138



N Suffix  
Plastic DIP  
AVG-001 Case



D Suffix  
Plastic SOP  
AVG-002 Case



### TRUTH TABLE

Inputs						Output							
$\bar{E}_1$	$\bar{E}_2$	$E_3$	$A_0$	$A_1$	$A_2$	$\bar{O}_0$	$\bar{O}_1$	$\bar{O}_2$	$\bar{O}_3$	$\bar{O}_4$	$\bar{O}_5$	$\bar{O}_6$	$\bar{O}_7$
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	H	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	H	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

H=High Logic Level

L=Low Logic Level

X=Don't Care

## ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	AC138, ACT138	Unit
V <sub>CC</sub>	DC Supply Voltage (Referenced to GND)	- 0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage (Referenced to GND)	- 0.5 to V <sub>CC</sub> +0.5	V
V <sub>OUT</sub>	DC Output Voltage (Referenced to GND)	- 0.5 to V <sub>CC</sub> +0.5	V
I <sub>IN</sub>	DC Input Current, per Pin	± 20	mA
I <sub>OUT</sub>	DC Output Sink/Source Current, per Pin	± 50	mA
I <sub>CC</sub>	DC V <sub>CC</sub> or GND Current per Output Pin	± 50	mA
T <sub>STG</sub>	Storage Temperature	- 65 to +150	°C

## GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
V <sub>CC</sub>	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V <sub>IN</sub> , V <sub>OUT</sub>	DC Input Voltage, Output Voltage, (Ref. to GND)	0		V <sub>CC</sub>	V	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 1) 'AC Devices	V <sub>CC</sub> @ 3.0 V			150	ns/V
		V <sub>CC</sub> @ 4.5 V			40	ns/V
		V <sub>CC</sub> @ 5.5 V			25	ns/V
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 2) 'ACT Devices	V <sub>CC</sub> @ 4.5 V			10	ns/V
		V <sub>CC</sub> @ 5.5 V			8.0	ns/V
T <sub>A</sub>	Operating Ambient Temperature Range	-40		85	°C	
CPD	Power Dissipation Capacitance	V <sub>CC</sub> = 5.0 V	60		pF	
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = 5.0 V	4.5		pF	

1. V<sub>IN</sub> from 30% to 70% V<sub>CC</sub>

2. V<sub>IN</sub> from 0.8 to 2.0 V

## AC — 138

### DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	74AC138			Unit	
				T <sub>A</sub> = +25°C		T <sub>A</sub> = -40 to +85°C		
				Typ	Guaranteed Limits			
V <sub>IH</sub>	Minimum High Level Input Voltage	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1 V	3.0	1.5	2.1	2.1	V	
			4.5	2.25	3.15	3.15		
			5.5	2.75	3.85	3.85		
V <sub>IL</sub>	Maximum Low Level Input Voltage	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1 V	3.0	1.5	0.9	0.9	V	
			4.5	2.25	1.35	1.35		
			5.5	2.75	1.65	1.65		
V <sub>OH</sub>	Minimum High Level Output Voltage	I <sub>OUT</sub> = -50 μA	3.0	2.99	2.9	2.9	V	
			4.5	4.49	4.4	4.4		
			5.5	5.49	5.4	5.4		
		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	-12mA	3.0		2.56	2.46	V
			I <sub>OH</sub> -24mA -24 mA	4.5		3.86	3.76	
V <sub>OL</sub>	Maximum Low Level Output Voltage	I <sub>OUT</sub> = 50 μA	3.0	0.002	0.1	0.1	V	
			4.5	0.001	0.1	0.1		
			5.5	0.001	0.1	0.1		
		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>	12mA	3.0		0.36	0.44	V
			I <sub>OL</sub> 24mA 24 mA	4.5		0.36	0.44	
			5.5		0.36	0.44		

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Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	74AC138			Unit
				T <sub>A</sub> = +25°C		T <sub>A</sub> = -40 to +85°C	
				Typ	Guaranteed Limits		
I <sub>IN</sub>	Maximum Input Leakage Current	V <sub>IN</sub> =V <sub>CC</sub> , GND	5.5		±0.1	±1.0	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5		8.0	80	μA

### AC CHARACTERISTICS over full operating conditions

Symbol	Parameter	V <sub>CC</sub> ±10% (V)	AC138				Unit
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		
			Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay A <sub>n</sub> to $\bar{O}_n$	3.3 5.0	1.5 1.5	13.0 9.5	1.5 1.5	15.0 10.5	ns
t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> to $\bar{O}_n$	3.3 5.0	1.5 1.5	12.5 9.0	1.5 1.5	14.0 10.5	ns
t <sub>PLH</sub>	Propagation Delay $\bar{E}_1$ or $\bar{E}_2$ to $\bar{O}_n$	3.3 5.0	1.5 1.5	15.0 11.0	1.5 1.5	16.0 12.0	ns
t <sub>PHL</sub>	Propagation Delay $\bar{E}_1$ or $\bar{E}_2$ to $\bar{O}_n$	3.3 5.0	1.5 1.5	13.5 9.5	1.5 1.5	15.0 10.5	ns
t <sub>PLH</sub>	Propagation Delay E <sub>3</sub> to $\bar{O}_n$	3.3 5.0	1.5 1.5	15.5 11.0	1.5 1.5	16.5 12.5	ns
t <sub>PHL</sub>	Propagation Delay E <sub>3</sub> to $\bar{O}_n$	3.3 5.0	1.5 1.5	13.0 8.0	1.5 1.0	14.0 9.5	ns

## ACT — 138

### DC ELECTRICAL CHARACTERISTICS

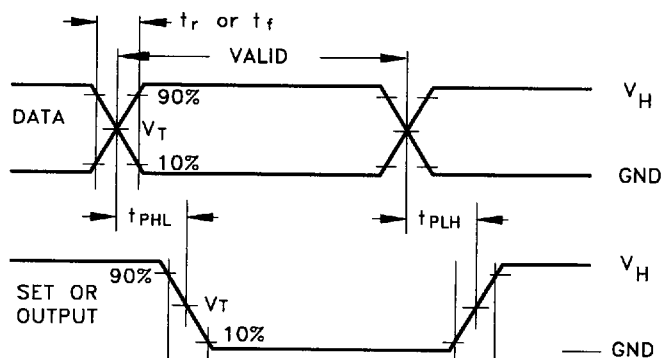
Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	ACT138			Unit
				T <sub>A</sub> = +25°C		T <sub>A</sub> = -40 to +85°C	
				Typ	Guaranteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1 V	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V
V <sub>IL</sub>	Maximum Low Level Input Voltage	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1 V	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V
V <sub>OH</sub>	Minimum High Level Output Voltage	I <sub>OUT</sub> = -50 μA	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V
		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24mA -24 mA	4.5 5.5		3.86 4.86	3.76 4.76	V
V <sub>OL</sub>	Maximum Low Level Output Voltage	I <sub>OUT</sub> = 50 μA	3.0 4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V
		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OL</sub> = 24mA 24 mA	3.0 4.5 5.5		0.36 0.36	0.44 0.44	V
I <sub>IN</sub>	Maximum Input Leakage Current	V <sub>I</sub> =V <sub>CC</sub> , GND	5.5		±0.1	±1.0	μA
ΔI <sub>CCCT</sub>	Additional Max I <sub>CC</sub> /Input	V <sub>I</sub> =V <sub>CC</sub> - 2.1 V	5.5	0.6		1.5	mA
I <sub>CC</sub>	Maximum Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5		8.0	80	μA

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### AC CHARACTERISTICS over full operating conditions

Symbol	Parameter	V <sub>CC</sub> ±10% (V)	ACT138				Unit
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF		
			Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay, An to $\bar{O}n$	5.0	1.5	10.5	1.5	11.5	ns
t <sub>PHL</sub>	Propagation Delay, An to $\bar{O}n$	5.0	1.5	10.5	1.5	11.5	ns
t <sub>PLH</sub>	Propagation Delay, $\bar{E}1$ or $\bar{E}2$ to $\bar{O}n$	5.0	2.5	11.5	2.0	12.5	ns
t <sub>PHL</sub>	Propagation Delay, $\bar{E}1$ or $\bar{E}2$ to $\bar{O}n$	5.0	2.0	11.5	2.0	12.5	ns
t <sub>PLH</sub>	Propagation Delay, E3 to $\bar{O}n$	5.0	2.5	12.0	2.0	13.0	ns
t <sub>PHL</sub>	Propagation Delay, E3 to $\bar{O}n$	5.0	2.0	10.5	1.5	11.5	ns

### SWITCHING WAVEFORMS



Input and output threshold voltage:  
 $V_T = 50\% V_{CC}$  for AC; 1.5V for ACT  
 $V_H = V_{CC}$  for AC, 3V for ACT