

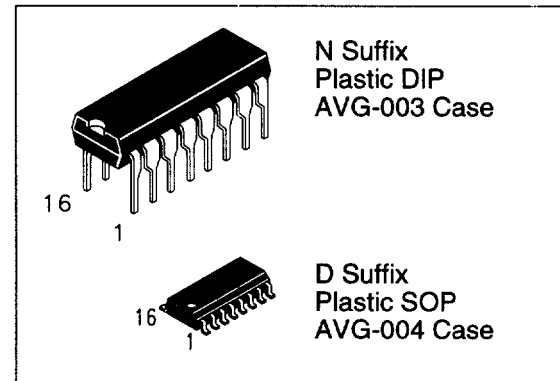
Available Q3, 1995

### 8 Input Multiplexer with 3-State Outputs, 8 Input Digital Multiplexer

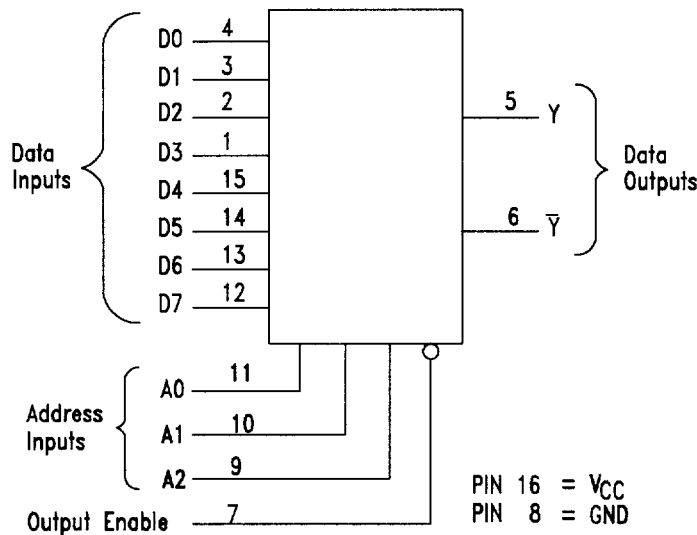
This device is a high speed, 1-of-8 digital multiplexer. It is able to select one line of data from up to eight inputs. The DV74AC251/ACT251 can be utilized as a universal function generator to generate any four variable logic function. Both true and complementary outputs are provided.

- 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

### DV74AC251 DV74ACT251



#### LOGIC DIAGRAM



#### TRUTH TABLE

Output Enable	Inputs			Outputs	
	A2	A1	A0	$\bar{Y}$	Y
H	X	X	X	Z	Z
L	L	L	L	$\bar{D}_0$	D <sub>0</sub>
L	L	L	H	$\bar{D}_1$	D <sub>1</sub>
L	L	H	L	$\bar{D}_2$	D <sub>2</sub>
L	L	H	H	$\bar{D}_3$	D <sub>3</sub>
L	H	L	L	$\bar{D}_4$	D <sub>4</sub>
L	H	L	H	$\bar{D}_5$	D <sub>5</sub>
L	H	H	L	$\bar{D}_6$	D <sub>6</sub>
L	H	H	H	$\bar{D}_7$	D <sub>7</sub>

H = HIGH Voltage Level, L = LOW Voltage Level  
X = Either Low or High Logic Level, Z = High Impedance

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#### ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	AC251, ACT251	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	
C <sub>IN</sub>	Input Capacitance V <sub>CC</sub> = 5.0 V	V <sub>CC</sub> = 5.0 V		4.5		pF
CPD	Power Dissipation Capacitance	V <sub>CC</sub> = 5.0 V		70		pF

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

## AC — 251

### DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	AC251			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>	I <sub>OH</sub>	-12mA	3.0		2.56	2.46	V
				-24mA	4.5		3.86	3.76	
		-24 mA	5.5		4.86	4.76			
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>	I <sub>OH</sub>	12mA	3.0		0.36	0.44	V
				24mA	4.5		0.36	0.44	
		24 mA	5.5		0.36	0.44			
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>OZ</sub>	Maximum 3-state current	V <sub>IN</sub> = (OE) = V <sub>IL</sub> , V <sub>IH</sub> V <sub>IN</sub> = V <sub>CC</sub> , GND V <sub>OUT</sub> = V <sub>CC</sub> , GND	5.5		±0.5	±5.0	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

Symbol	Parameter ( $C_L = 50 \text{ pF}$ )	$V_{CC}$ (V) $\pm 10\%$	ACT251					Unit
			$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		
			Min	Typ	Max	Min	Max	
$t_{PLH}$	Propagation Delay $A_n$ to Y or $\bar{Y}$	3.3	1.5	11.5	17.5	1.5	19.0	ns
$t_{PHL}$		5.0	1.5	8.5	12.5	1.5	13.5	
$t_{PLH}$	Propagation Delay D to Y or $\bar{Y}$	3.3	1.5	10	14	1.5	15.5	ns
$t_{PHL}$		5.0	1.5	7.0	10	1.5	11	
$t_{PZH}$	Output Enable Time Output Enable to Y or $\bar{Y}$	3.3	1.5	7.5	11	1.5	12	ns
$t_{PZL}$		5.0	1.5	5.5	8	1.5	9.0	
$t_{PHZ}$	Output Disable Time Output Enable to Y or $\bar{Y}$	3.3	1.5	8.5	11.5	1.5	13	ns
$t_{PLZ}$		5.0	1.5	7.0	9.5	1.5	10	
$t_{PLH}$	Propagation Delay $A_n$ to Y or $\bar{Y}$	3.3	1.5	11.5	17.5	1.5	19.0	ns
$t_{PHL}$		5.0	1.5	8.5	12.5	1.5	13.5	

## ACT — 251

### DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	$V_{CC}$ (V)	ACT251			Unit
				$T_A = +25^\circ\text{C}$		$T_A = -40$ to $+85^\circ\text{C}$	
				Typ	Guaranteed Limits		
$V_{IH}$	Minimum High Level Input Voltage	$V_{OUT} = 0.1\text{V}$ or $V_{CC} - 0.1\text{V}$	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V
$V_{IL}$	Maximum Low Level Input Voltage	$V_{OUT} = 0.1\text{V}$ or $V_{CC} - 0.1\text{V}$	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V
$V_{OH}$	Minimum High Level Output Voltage	$I_{OUT} = -50 \mu\text{A}$	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V
		$V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OH} = -24\text{mA}$ $-24 \text{ mA}$	4.5 5.5		3.86 4.86	3.76 4.76	V
$V_{OL}$	Maximum Low Level Output Voltage	$I_{OUT} = 50 \mu\text{A}$	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V
		$V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 24\text{mA}$ $24 \text{ mA}$	4.5 5.5		0.36 0.36	0.44 0.44	V
$I_{IN}$	Maximum Input Leakage Current	$V_{IN} = V_{CC}, \text{GND}$	5.5		$\pm 0.1$	$\pm 1.0$	$\mu\text{A}$
$\Delta I_{CC}$	Additional Max $I_{CC}$ /Input	$V_{IN} = V_{CC} - 2.1\text{V}$	5.5	0.6		1.5	$\text{mA}$
$I_{OZ}$	Maximum 3-State Current	$V_{IN} = (\text{OE}) = V_{IL}, V_{IH}$ $V_{IN} = V_{CC}, \text{GND}$ $V_{OUT} = V_{CC}, \text{GND}$	5.5		$\pm 0.5$	$\pm 5.0$	$\mu\text{A}$
$I_{CC}$	Maximum Quiescent Supply Current		5.5		8.0	80	$\mu\text{A}$

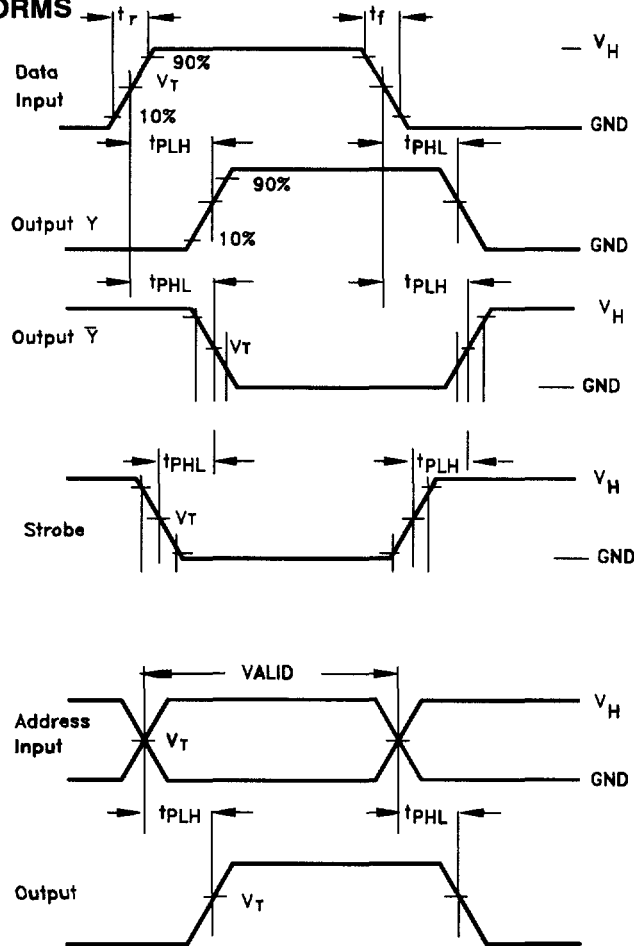
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## AC CHARACTERISTICS

Symbol	Parameter ( $C_L = 50 \text{ pF}$ )	$V_{CC}^*$ (V) $\pm 10\%$	ACT251					Unit
			$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		
			Min	Typ	Max	Min	Max	
$t_{PLH}$	Propagation Delay $A_n$ to Y or $\bar{Y}$	5.0	2.5	7.0	15.5	2.0	17	ns
$t_{PHL}$			2.5	7.5	16.5	2.5	18.5	
$t_{PLH}$	Propagation Delay D to Y or $\bar{Y}$	5.0	2.5	5.5	12	2.0	13	ns
$t_{PHL}$			2.5	6.5	12.5	2.5	14	
$t_{PZH}$	Output Enable Time Output Enable to Y or $\bar{Y}$	5.0	1.5	5.0	8.5	1.5	9.0	ns
$t_{PZL}$			1.5	4.5	8.5	1.5	9.5	
$t_{PHZ}$	Output Disable Time Output Enable to Y or $\bar{Y}$	5.0	2.0	6.0	12	2.0	13	ns
$t_{PLZ}$			1.5	4.5	8.5	1.5	9	

Symbol	Parameter	Test Conditions	Value Typ	Unit
$C_{IN}$	Input Capacitance	$V_{CC} = 5.0 \text{ V}$	4.5	pF
$C_{PD}$	Power Dissipation Capacitance	$V_{CC} = 5.0 \text{ V}$	40	pF

## 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