



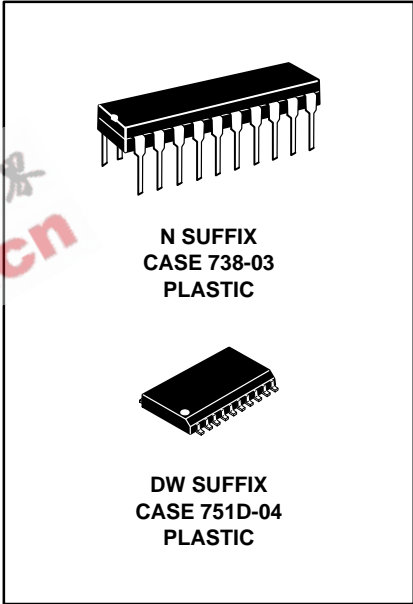
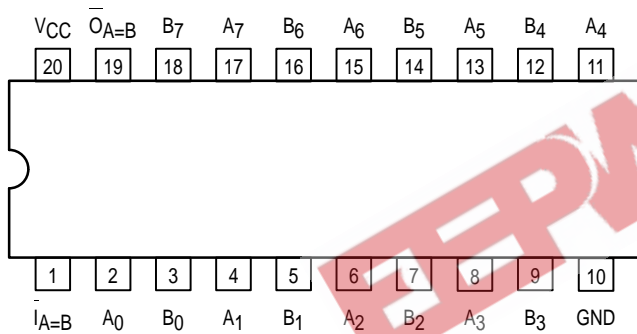
# MC74AC521 MC74ACT521

## 8-BIT IDENTITY COMPARATOR

### 8-Bit Identity Comparator

The MC74AC521/74ACT521 is an expandable 8-bit comparator. It compares two words of up to eight bits each and provides a LOW output when the two words match bit for bit. The expansion input  $I_{A=B}$  also serves as an active LOW enable input.

- Compares Two 8-Bit Words in 6.5 ns Typ
- Expandable to Any Word Length
- 20-Pin Package
- Outputs Source/Sink 24 mA
- 'ACT521 has TTL-Compatible Inputs



#### PIN NAMES

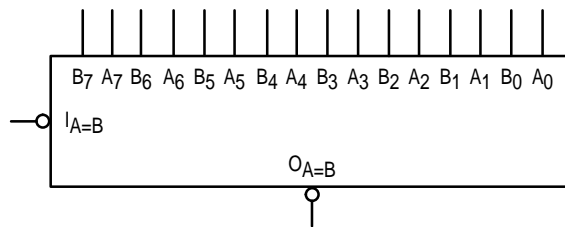
- A<sub>0</sub>-A<sub>7</sub> Word A Inputs
- B<sub>0</sub>-B<sub>7</sub> Word B Inputs
- $I_{A=B}$  Expansion or Enable Input
- $O_{A=B}$  Identity Output

#### TRUTH TABLE

Inputs		Outputs
$I_{A=B}$	A, B	$O_{A=B}$
L	A = B*	L
L	A ≠ B	H
H	A = B*	H
H	A ≠ B	H

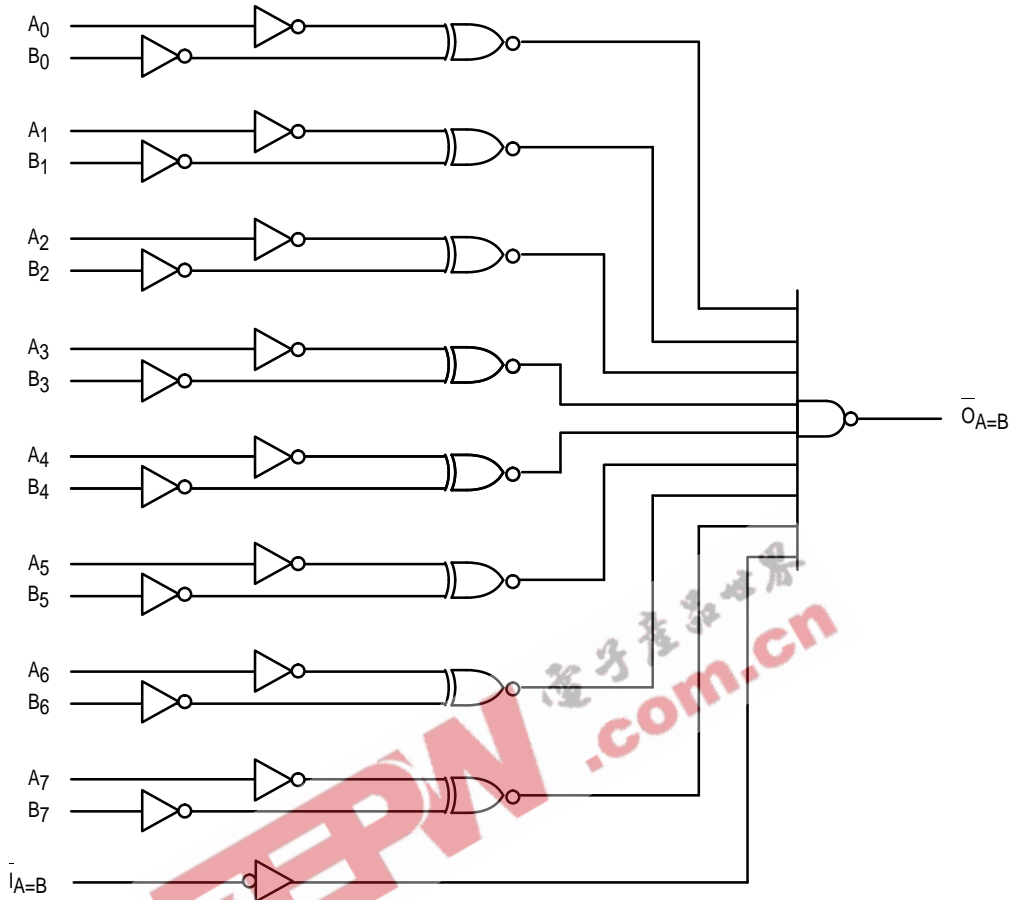
H = HIGH Voltage Level  
L = LOW Voltage Level  
\*A<sub>0</sub>=B<sub>0</sub>, A<sub>1</sub>=B<sub>1</sub>, A<sub>2</sub>=B<sub>2</sub>, etc.

#### LOGIC SYMBOL



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## LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

### 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)	-0.5 to $V_{CC} + 0.5$	V
$V_{out}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{in}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{out}$	DC Output Sink/Source Current, per Pin	$\pm 50$	mA
$I_{CC}$	DC $V_{CC}$ or GND Current per Output Pin	$\pm 50$	mA
$T_{stg}$	Storage Temperature	-65 to +150	$^{\circ}C$

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

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## RECOMMENDED 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 except Schmitt Inputs	V <sub>CC</sub> @ 3.0 V		150		ns/V
		V <sub>CC</sub> @ 4.5 V		40		
		V <sub>CC</sub> @ 5.5 V		25		
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V <sub>CC</sub> @ 4.5 V		10		ns/V
		V <sub>CC</sub> @ 5.5 V		8.0		
T <sub>J</sub>	Junction Temperature (PDIP)			140	°C	
T <sub>A</sub>	Operating Ambient Temperature Range	-40	25	85	°C	
I <sub>OH</sub>	Output Current — High			-24	mA	
I <sub>OL</sub>	Output Current — Low			24	mA	

1. V<sub>in</sub> from 30% to 70% V<sub>CC</sub>; see individual Data Sheets for devices that differ from the typical input rise and fall times.  
 2. V<sub>in</sub> from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		74AC		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits	Typ	Guaranteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 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	3.0	1.5	0.9	0.9	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 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	3.0	2.99	2.9	2.9	V	I <sub>OUT</sub> = -50 μA	
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
		3.0		2.56	2.46	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -12 mA I <sub>OH</sub> -24 mA -24 mA	
		4.5		3.86	3.76			
5.5		4.86	4.76					
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
		3.0		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 12 mA I <sub>OL</sub> 24 mA 24 mA	
		4.5		0.36	0.44			
5.5		0.36	0.44					
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

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### AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			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	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to O <sub>A=B</sub>	3.3 5.0	3.5 2.5		11 8.0	3.0 2.0	12 9.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to O <sub>A=B</sub>	3.3 5.0	4.5 3.0		11.5 8.5	3.5 2.5	12.5 9.0	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>A=B</sub> to O <sub>A=B</sub>	3.3 5.0	3.0 2.5		8.0 6.0	2.5 2.0	9.0 7.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay I <sub>A=B</sub> to O <sub>A=B</sub>	3.3 5.0	3.0 2.0		8.0 6.0	2.5 2.0	9.0 7.0	ns	3-6

\* Voltage Range 3.3 V is 3.3 V ± 0.3 V.  
Voltage Range 5.0 V is 5.0 V ± 0.5 V.

### DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits	Typ	Guaranteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5		3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -24 mA	
		5.5		4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5		0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 24 mA	
		5.5		0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CCCT</sub>	Additional Max. I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5			75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		8.0	80	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

\* All outputs loaded; thresholds on input associated with output under test.  
† Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC521 MC74ACT521

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

Symbol	Parameter	V <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			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	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to O <sub>A=B</sub>	5.0	3.0		9.0	2.5	9.5	ns	3-6
t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to O <sub>A=B</sub>	5.0	3.0		10	2.5	11	ns	3-6
t <sub>PLH</sub>	Propagation Delay I <sub>A=B</sub> to O <sub>A=B</sub>	5.0	2.0		6.5	2.0	7.0	ns	3-6
t <sub>PHL</sub>	Propagation Delay I <sub>A=B</sub> to O <sub>A=B</sub>	5.0	2.5		7.5	2.0	8.0	ns	3-6

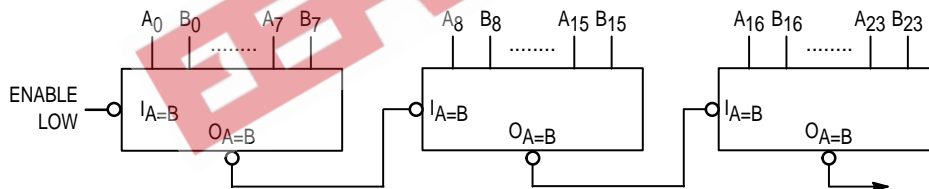
\* Voltage Range 5.0 V is 5.0 V ± 0.5 V.

## CAPACITANCE

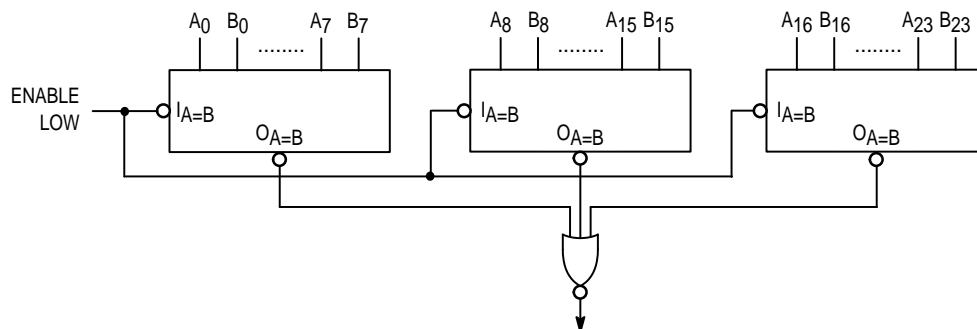
Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	40	pF	V <sub>CC</sub> = 5.0 V

## APPLICATIONS

### RIPPLE EXPANSION

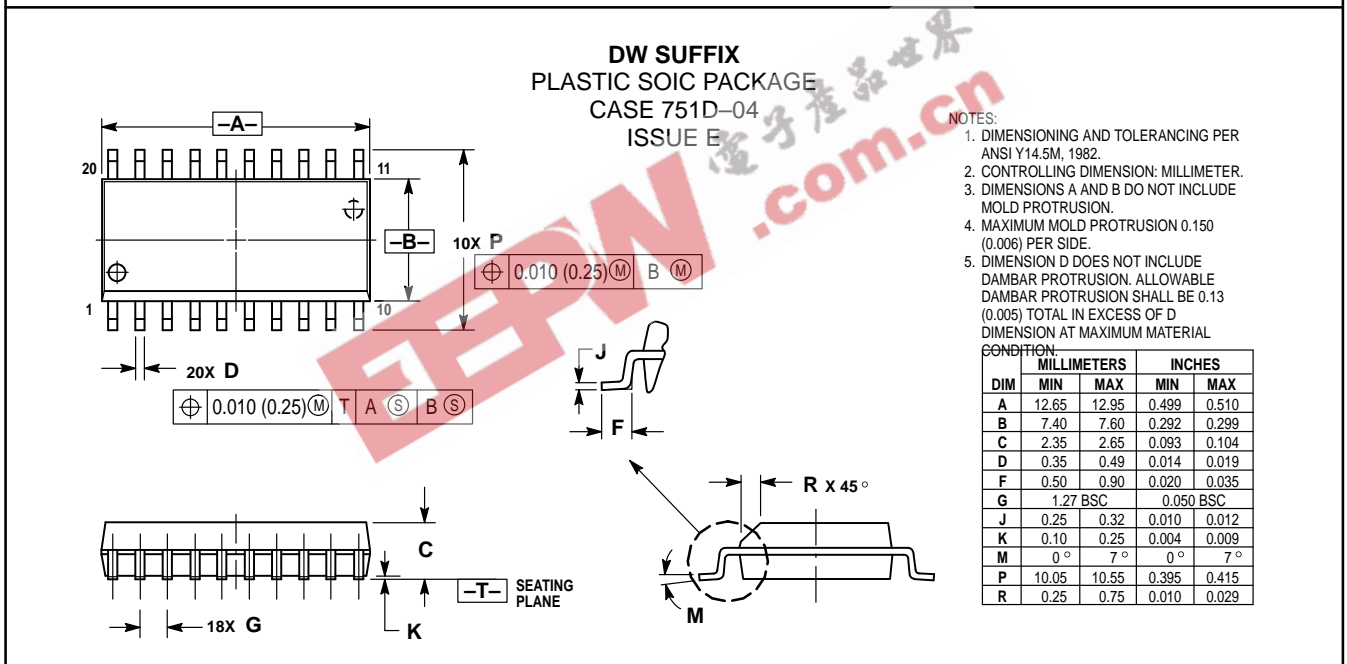
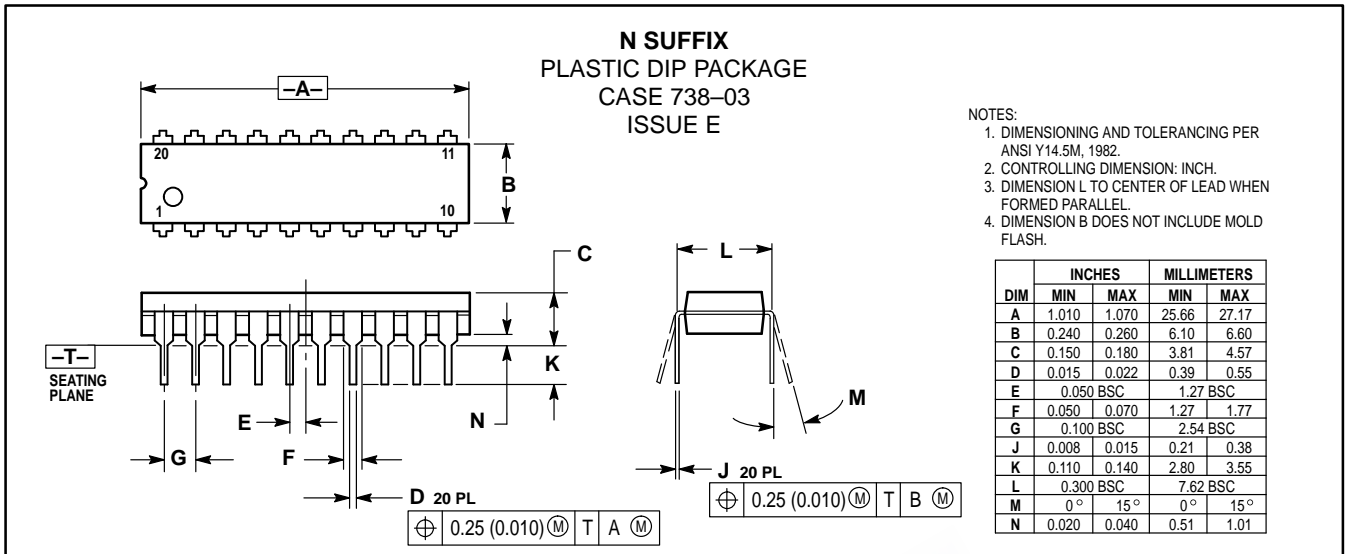


### PARALLEL EXPANSION



# MC74AC521 MC74ACT521

## OUTLINE DIMENSIONS



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