



National Semiconductor

September 1998

## 54FCT521

### 8-Bit Identity Comparator

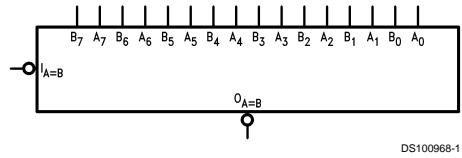
#### General Description

The 'FCT521 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  $\bar{I}_{A=B}$  also serves as an active LOW enable input.

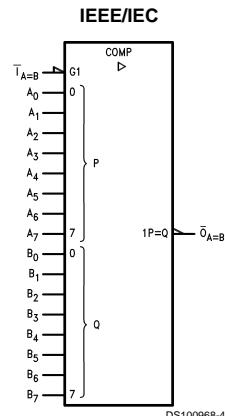
#### Features

- Expandable to any word length
- Outputs sink capability of 32mA, source capability of 12 mA
- TTL input and output level compatible
- CMOS power consumption
- Standard microcircuit Drawing (SMD) 5962-8854301

#### Logic Symbols



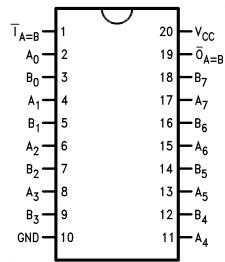
DS100968-1



DS100968-4

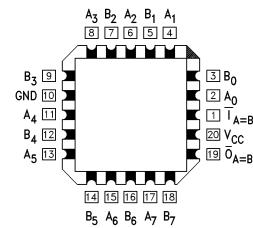
#### Connection Diagram

Pin Assignment for DIP and CERPACK



DS100968-2

Pin Assignment for LCC



DS100968-3

#### Pin Descriptions

Pin Names	Description
A <sub>0</sub> -A <sub>7</sub>	Word A Inputs
B <sub>0</sub> -B <sub>7</sub>	Word B Inputs
T <sub>A</sub> = B	Expansion or Enable Input
O <sub>A</sub> = B	Identity Output

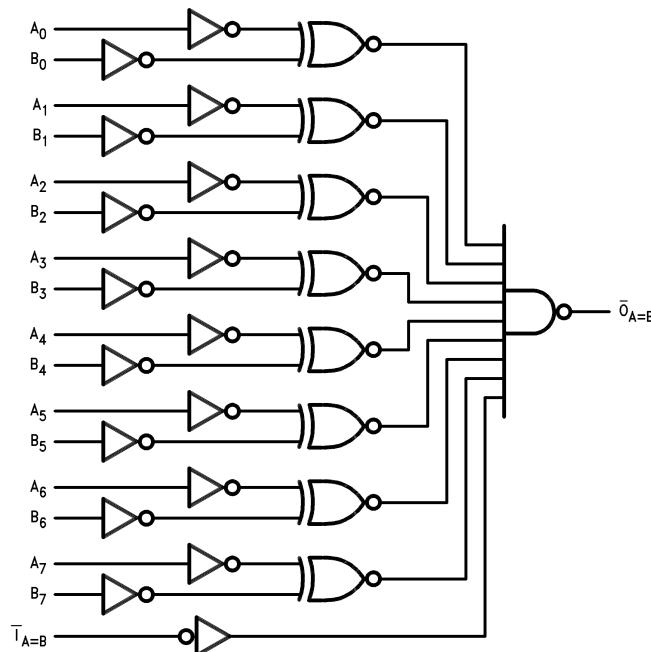
## Truth Table

Inputs		Outputs
$\bar{I}_{A=B}$	A, B	$\bar{O}_{A=B}$
L	A = B (Note 1)	L
L	A $\neq$ B	H
H	A = B (Note 1)	H
H	A $\neq$ B	H

H = HIGH Voltage Level  
L = LOW Voltage Level

Note 1:  $A_0 = B_0, A_1 = B_1, A_2 = B_2$ , etc.

## Logic Diagram



DS100968-5

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

Absolute Maximum Ratings (Note 2)		Storage Temperature ( $T_{STG}$ )	-65°C to +150°C			
If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.		Junction Temperature ( $T_J$ )	175°C			
Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V	CDIP				
DC Input Diode Current ( $I_{IK}$ )						
$V_I = -0.5V$	-20 mA					
$V_I = V_{CC} + 0.5V$	+20 mA					
DC Input Voltage ( $V_I$ )	-0.5V to $V_{CC} + 0.5V$					
DC Output Diode Current ( $I_{OK}$ )						
$V_O = -0.5V$	-20 mA					
$V_O = V_{CC} + 0.5V$	+20 mA					
DC Output Voltage ( $V_O$ )	-0.5V to $V_{CC} + 0.5V$					
DC Output Source or Sink Current ( $I_O$ )	$\pm 50$ mA					
DC $V_{CC}$ or Ground Current per Output Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 50$ mA					
<b>Recommended Operating Conditions</b>						
Supply Voltage ( $V_{CC}$ )	FCT		4.5V to 5.5V			
Input Voltage ( $V_I$ )			0V to $V_{CC}$			
Output Voltage ( $V_O$ )			0V to $V_{CC}$			
Operating Temperature ( $T_A$ )	54FCT		-55°C to +125°C			
<b>Note 2:</b> Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.						
<b>DC Electrical Characteristics for 'FCT Family Devices</b>						
Symbol	Parameter	54FCT	Units	$V_{CC}$	Conditions	
		Min				Max
$V_{IH}$	Input HIGH Voltage	2.0	V		Recognized HIGH Signal	
$V_{IL}$	Input LOW Voltage	0.8	V		Recognized LOW Signal	
$V_{CD}$	Input Clamp Diode Voltage	-1.2	V	Min	$I_{IN} = -18$ mA	
$V_{OH}$	Output HIGH Voltage	54FCT	V	Min	$I_{OH} = -300$ $\mu$ A	
		54FCT	V	Min	$I_{OH} = -12$ mA	
$V_{OL}$	Output LOW Voltage	54FCT	0.2	V	Min	$I_{OL} = 300$ $\mu$ A
		54FCT	0.5	V	Min	$I_{OL} = 32$ mA
$I_{IH}$	Input HIGH Current	5	$\mu$ A	Max	$V_{IN} = V_{CC}$	
$I_{IL}$	Input LOW Current	-5	$\mu$ A	Max	$V_{IN} = 0.0V$	
$I_{OS}$	Output Short-Circuit Current	-60	mA	Max	$V_{OUT} = 0.0V$	
$I_{CCQ}$	Quiescent Power Supply Current	1.5	mA	Max	$V_{IN} < 0.2V$ or $V_{IN} 5.3V$ , $V_{CC} = 5.5V$	
$\Delta I_{CC}$	Quiescent Power Supply Current	2.0	mA	Max	$V_I = V_{CC} - 2.1V$	
$I_{CCD}$	Dynamic $I_{CC}$	0.25	mA/MHz	Max	$V_{CC} = 5.5V$ , Outputs Open, One Bit Toggling, 50% Duty Cycle, $\overline{OE}_n = GND$	
$I_{CC}$	Total Power Supply Current	5.0	mA	Max	$V_{CC} = 5.5V$ , Outputs Open, $f_l = 10MHz$ , $\overline{OE}_n = GND$ , One Bit Toggling, 50% Duty Cycle	

### AC Electrical Characteristics for 'FCT Family Devices

Symbol	Parameter	V <sub>CC</sub> (V) (Note 5)	T <sub>A</sub> = -55°C to +125°C C <sub>L</sub> = 50 pF		Units
			Min	Max	
t <sub>PLH</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to $\bar{O}_A = B$	5.0	1.5	15.0	ns
t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> or B <sub>n</sub> to $\bar{O}_A = B$	5.0	1.5	15.0	ns
t <sub>PLH</sub>	Propagation Delay $\bar{I}_A = B$ to $\bar{O}_A = B$	5.0	1.5	9.0	ns
t <sub>PHL</sub>	Propagation Delay $\bar{I}_A = B$ to $\bar{O}_A = B$	5.0	1.5	9.0	ns

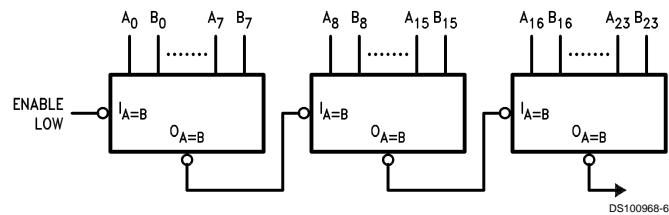
Note 5: Voltage Range 5.0 is 5.0V  $\pm 0.5V$

### Capacitance

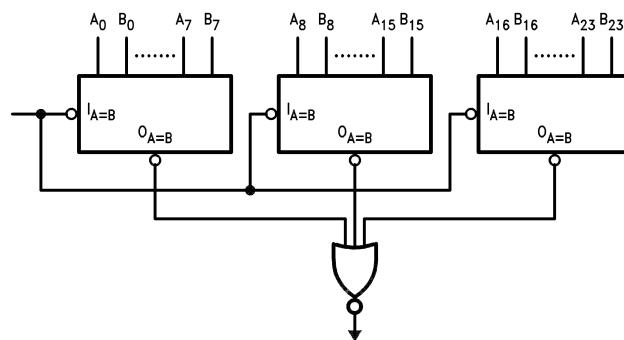
Symbol	Parameter	Typ	Units	Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = OPEN
C <sub>PD</sub>	Power Dissipation Capacitance	40	pF	V <sub>CC</sub> = 5.0V

## Applications

### Ripple Expansion

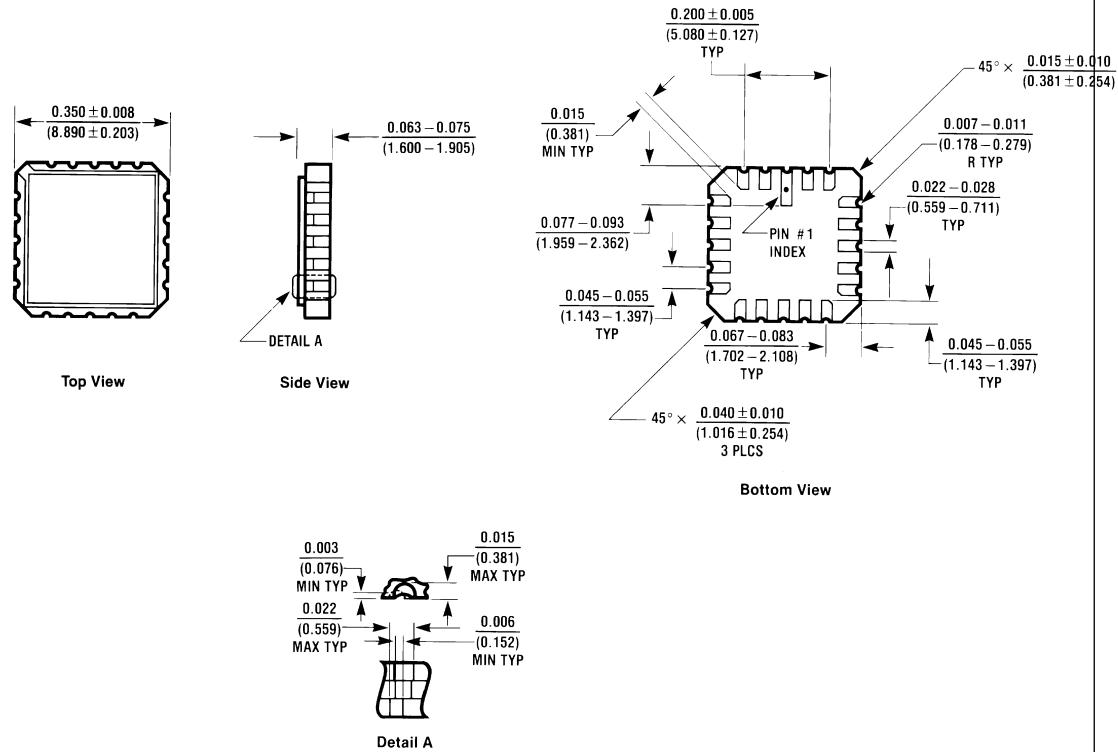


### Parallel Expansion



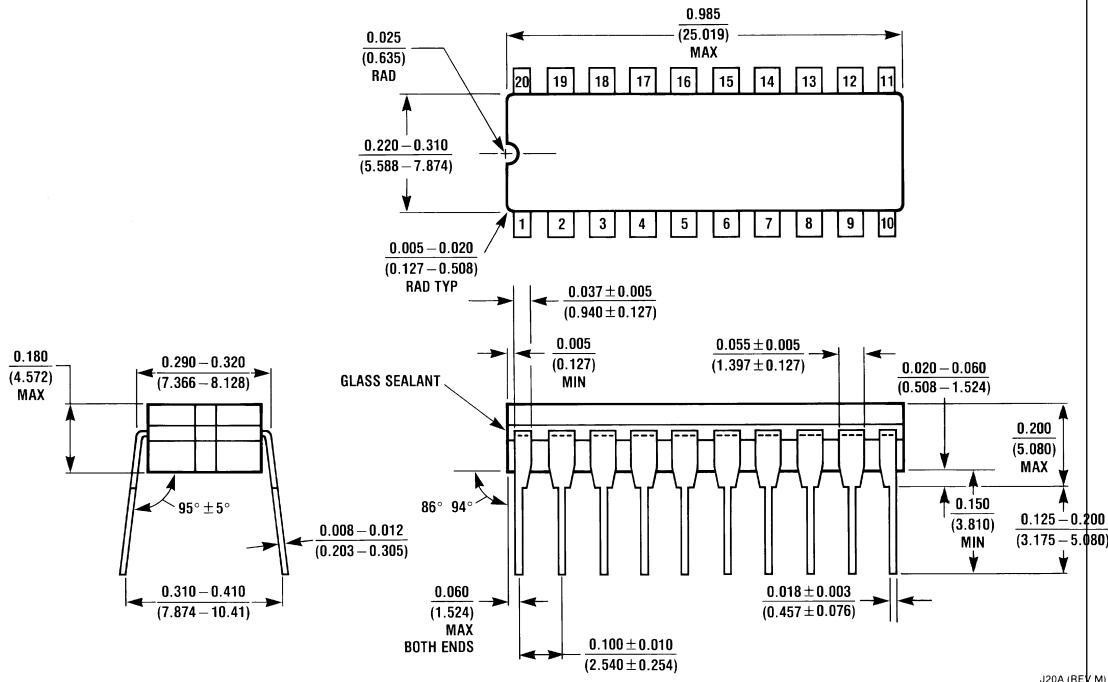
## Physical Dimensions

inches (millimeters) unless otherwise noted

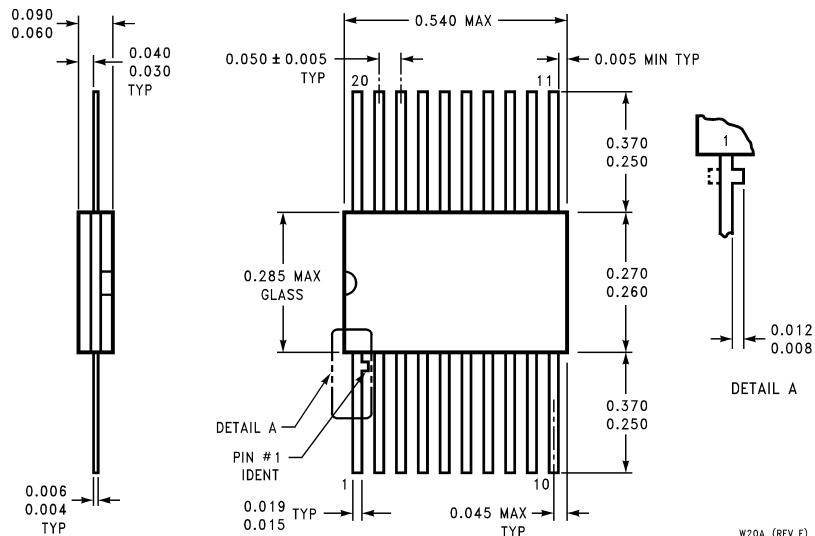


20-Lead Ceramic Leadless Chip Carrier  
Package Number E20A

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



20-Lead Ceramic Dual-in-line  
J20A



20-Lead Cerpack  
Package Number W20A

## 54FCT521 8-Bit Identity Comparator

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