September 1998

National Semiconductor

54FCT521
8-Bit Identity Comparator

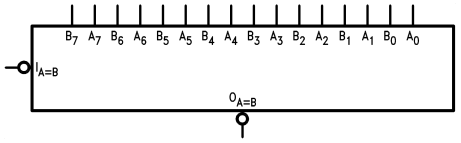
General Description

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 $\overline{I}_{A=B}$ also serves as an active LOW enable input.

Features

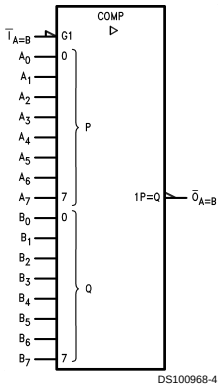
- Expandable to any word length
- Outputs sink capability of 32mA, source capability of 12 mA
- TTL input and output level compatible
- CMOS power consumption
- Standard microcircuit Drawing (SMD) 5962-8854301

Logic Symbols



DS100968-1

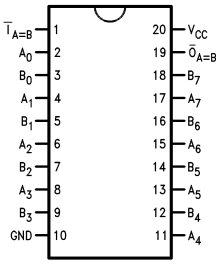
IEEE/IEC



DS100968-4

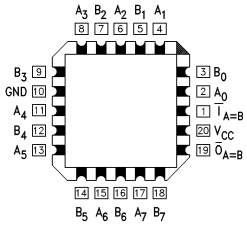
Connection Diagram

Pin Assignment for DIP and CERPACK



DS100968-2

Pin Assignment for LCC



DS100968-3

Pin Descriptions

Pin Names	Description
A_0–A_7	Word A Inputs
B_0–B_7	Word B Inputs
$T_{A=B}$	Expansion or Enable Input
$\overline{O}_{A=B}$	Identity Output

FACT™ is a trademark of Fairchild Semiconductor Corporation.

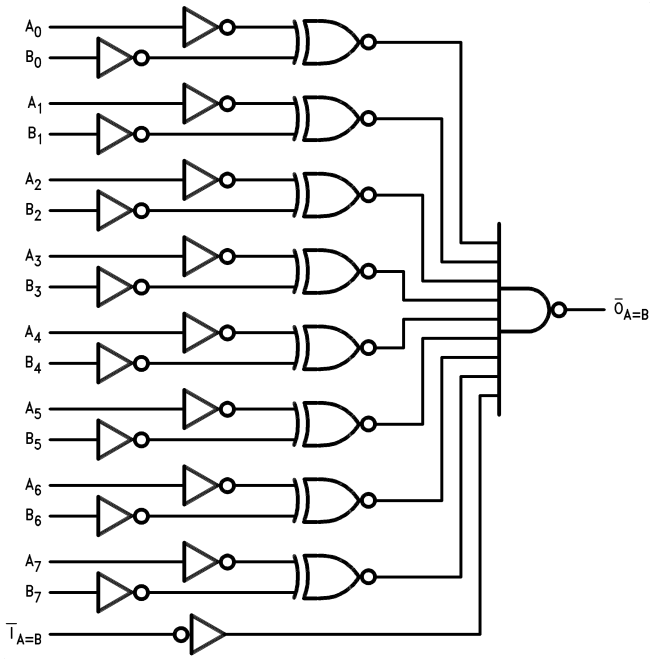
Truth Table

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

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage (V_{CC})	−0.5V to +7.0V
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)	±50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	±50 mA
Storage Temperature (T_{STG})	−65˚C to +150˚C
Junction Temperature (T_J)	
CDIP	175˚C

Recommended Operating Conditions

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

Note 2: 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.

DC Electrical Characteristics for 'FCT Family Devices

Symbol	Parameter		54FCT Min	54FCT Max	Units	V_{CC}	Conditions
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	4.3		V	Min	I_{OH} = −300 µA
		54FCT	2.4		V	Min	I_{OH} = −12 mA
V_{OL}	Output LOW Voltage	54FCT		0.2	V	Min	I_{OL} = 300 µA
		54FCT		0.5	V	Min	I_{OL} = 32 mA
I_{IH}	Input HIGH Current			5	µA	Max	V_{IN} = V_{CC}
I_{IL}	Input LOW Current			−5	µA	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
ΔI_{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, fI = 10MHz, $\overline{OE}_n$ = GND, One Bit Toggling, 50% Duty Cycle

Note 3: All outputs loaded; thresholds on input associated with output under test.

Note 4: Maximum test duration 2.0 ms, one output loaded at a time.

AC Electrical Characteristics for 'FCT Family Devices

Symbol	Parameter	V_{CC} (V) (Note 5)	T_A = −55°C to +125°C, C_L = 50 pF		Units
			Min	Max	
t_{PLH}	Propagation Delay A_n or B_n to $\overline{O}_{A = B}$	5.0	1.5	15.0	ns
t_{PHL}	Propagation Delay A_n or B_n to $\overline{O}_{A = B}$	5.0	1.5	15.0	ns
t_{PLH}	Propagation Delay $\overline{I}_{A = B}$ to $\overline{O}_{A = B}$	5.0	1.5	9.0	ns
t_{PHL}	Propagation Delay $\overline{I}_{A = B}$ to $\overline{O}_{A = B}$	5.0	1.5	9.0	ns

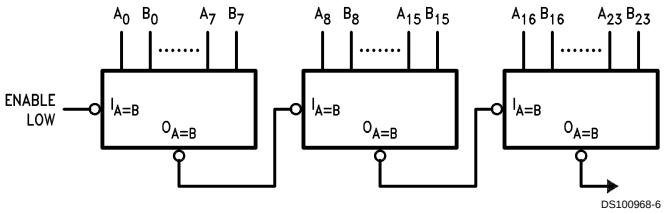
Note 5: Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

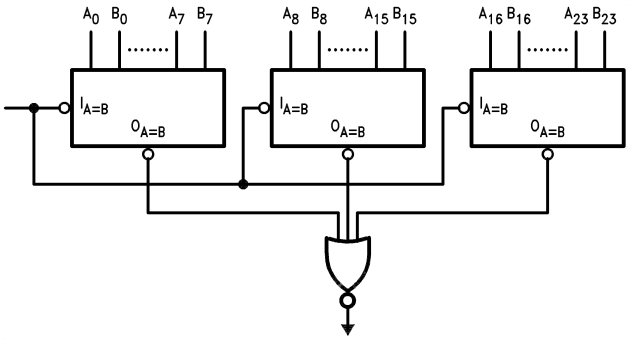
Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	40	pF	V_{CC} = 5.0V

Applications

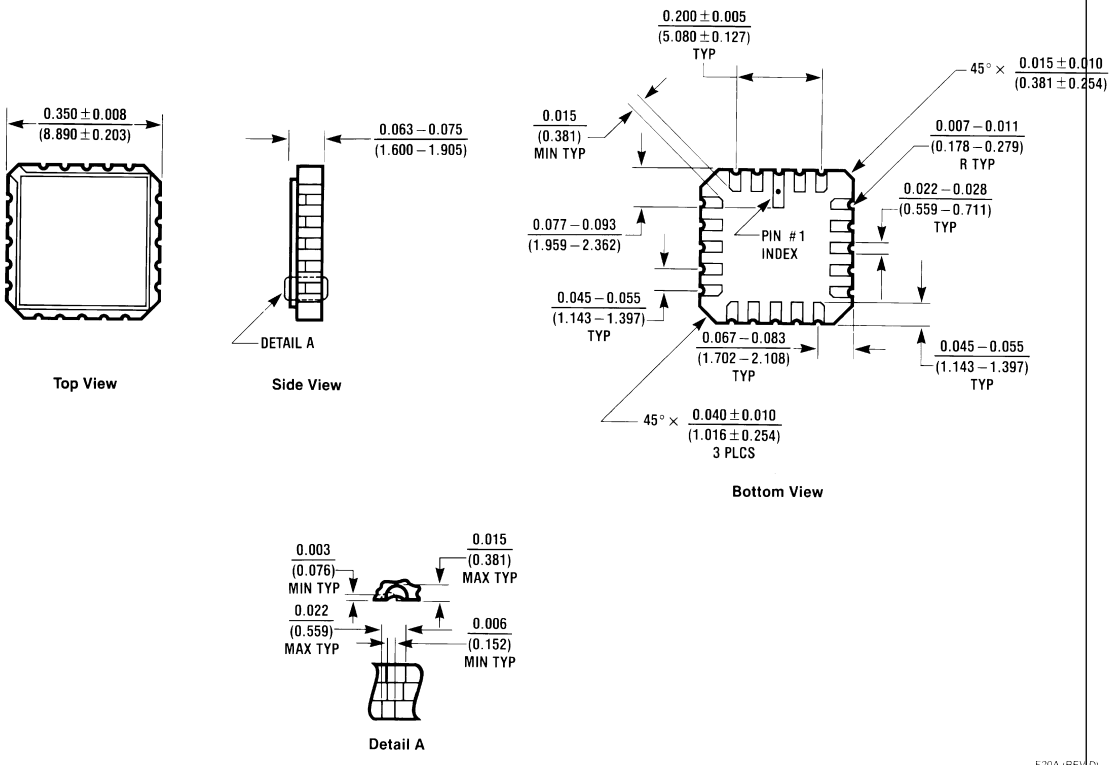
Ripple Expansion



Parallel Expansion

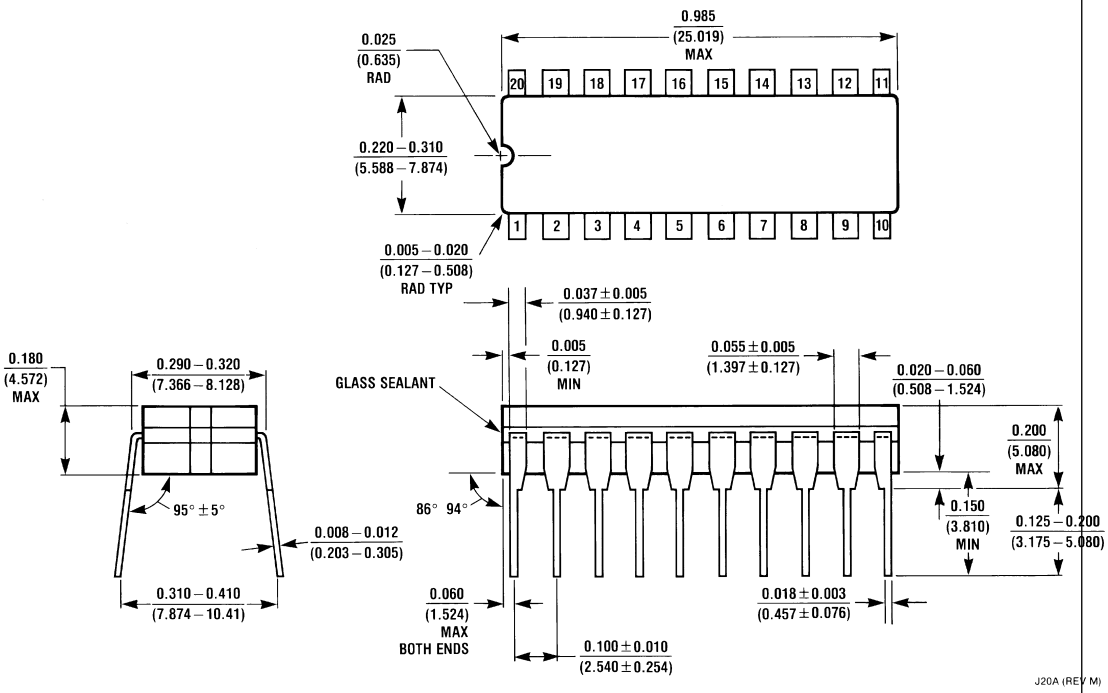


Physical Dimensions inches (millimeters) unless otherwise noted

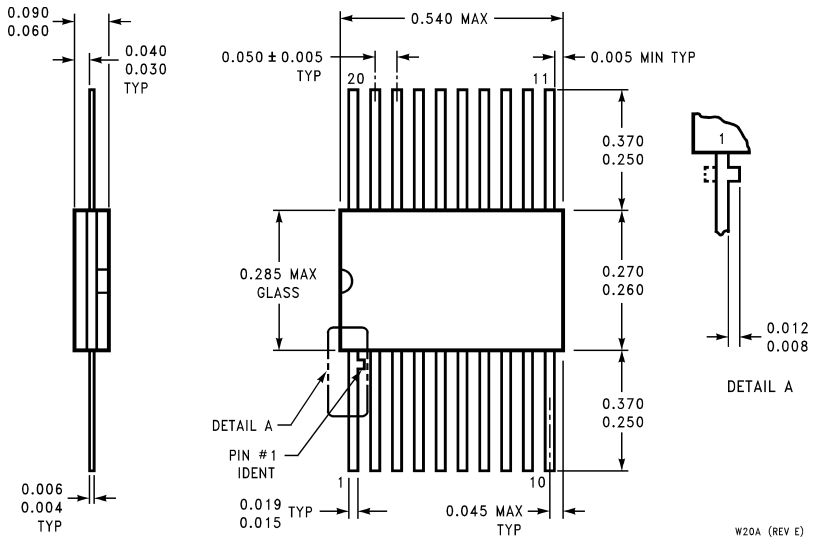


20-Lead Ceramic Leadless Chip Carrier
Package Number E20A

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



20-Lead Ceramic Dual-in-line
J20A



20-Lead Cerpack
Package Number W20A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179