

54AC521 • 54ACT521 8-Bit Identity Comparator

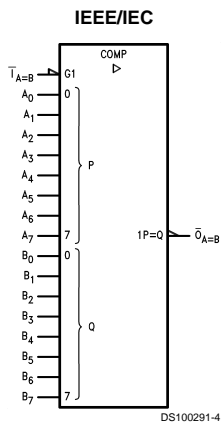
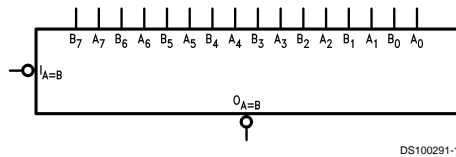
General Description

The AC/ACT521 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 $\bar{T}_{A=B}$ also serves as an active LOW enable input.

Features

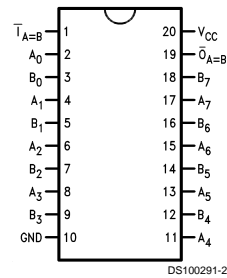
- I_{CC} reduced by 50%
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- Outputs source/sink 24 mA
- ACT521 has TTL-compatible inputs
- Standard microcircuit Drawing (SMD)
54AC521: 5962-90985
54ACT521: 5962-89793

Logic Symbols

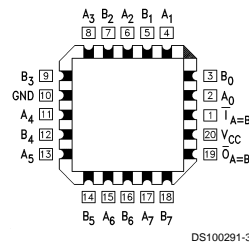


Connection Diagram

Pin Assignment for DIP and CERPACK



Pin Assignment for LCC



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
O _{A=B}	Identity Output

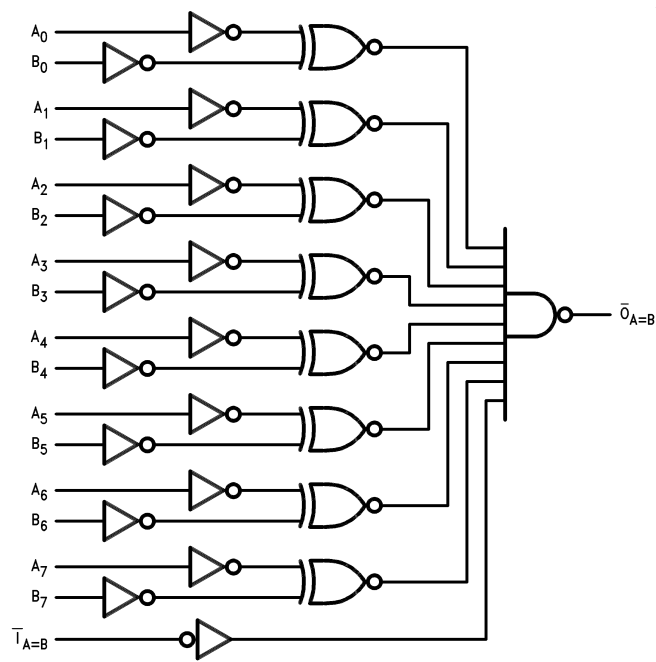
Truth Table

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



DS100291-5

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})	
AC	2.0V to 6.0V
ACT	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)	
54AC/ACT	-55°C to +125°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
AC Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns
ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

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. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	$T_A = -55^\circ\text{C to } +125^\circ\text{C}$		Units	Conditions	
			Guaranteed Limits				
V_{IH}	Minimum High Level Input Voltage	3.0	2.1		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	3.15				
		5.5	3.85				
V_{IL}	Maximum Low Level Input Voltage	3.0	0.9		V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	1.35				
		5.5	1.65				
V_{OH}	Minimum High Level Output Voltage	3.0	2.9		V	$I_{OUT} = -50 \mu A$	
		4.5	4.4				
		5.5	5.4				
			3.0	2.4		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -4 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA (Note 3)}$
			4.5	3.7			
		5.5	4.7				
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1		V	$I_{OUT} = 50 \mu A$	
		4.5	0.1				
		5.5	0.1				
			3.0	0.4		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA (Note 3)}$
			4.5	0.5			
		5.5	0.5				
I_{IN} (Note 5)	Maximum Input Leakage Current	5.5	±1.0		μA	$V_I = V_{CC}, GND$	
I_{OLD}	Minimum Dynamic Output Current (Note 4)	5.5	50		mA	$V_{OLD} = 1.65V \text{ Max}$	
I_{OHD}		5.5	-50		mA	$V_{OHD} = 3.85V \text{ Min}$	
I_{CC} (Note 5)	Maximum Quiescent Supply Current	5.5	80.0		μA	$V_{IN} = V_{CC}$ or GND	

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.

Note 5: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC} .

DC Electrical Characteristics for ACT

Symbol	Parameter	V _{CC} (V)	T _A = -55°C to +125°C		Units	Conditions	
			Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	4.5	2.0		V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	2.0				
V _{IL}	Maximum Low Level Input Voltage	4.5	0.8		V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	0.8				
V _{OH}	Minimum High Level Output Voltage	4.5	4.4		V	I _{OUT} = -50 μA	
		5.5	5.4				
			4.5	3.7		V	V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA I _{OH} = -24 mA (Note 6)
			5.5	4.7			
V _{OL}	Maximum Low Level Output Voltage	4.5	0.1		V	I _{OUT} = 50 μA	
		5.5	0.1				
		4.5	0.5				V
5.5	0.5						
I _{IN}	Maximum Input Leakage Current	5.5	±1.0		μA	V _I = V _{CC} , GND	
I _{CC} T	Maximum I _{CC} /Input	5.5	1.5		mA	V _I = V _{CC} - 2.1V	
I _{OLD}	Minimum Dynamic Output Current (Note 7)	5.5	50		mA	V _{OLD} = 1.65V Max	
I _{OHD}		5.5	-50		mA	V _{OHD} = 3.85V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0		μA	V _{IN} = V _{CC} or GND	

Note 6: All outputs loaded; thresholds on input associated with output under test.

Note 7: Maximum test duration 2.0 ms, one output loaded at a time.

AC Electrical Characteristics for AC

Symbol	Parameter	V _{CC} (V) (Note 8)	T _A = -55°C to +125°C C _L = 50 pF		Units
			Min	Max	
t _{PLH}	Propagation Delay A _n or B _n to $\overline{O}_{A=B}$	3.3	1.0	15.0	ns
		5.0	1.0	11.0	
t _{PHL}	Propagation Delay A _n or B _n to $\overline{O}_{A=B}$	3.3	1.0	10.5	ns
		5.0	1.0	8.0	
t _{PLH}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	3.3	1.0	15.0	ns
		5.0	1.0	11.0	
t _{PHL}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	3.3	1.0	10.5	ns
		5.0	1.0	8.0	

Note 8: Voltage Range 3.3 is 3.3V ±0.3V

Voltage Range 5.0 is 5.0V ±0.5V

AC Electrical Characteristics for ACT

Symbol	Parameter	V _{CC} (V) (Note 9)	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	11.0	ns
t _{PHL}	Propagation Delay A _n or B _n to $\overline{O}_{A=B}$	5.0	1.5	12.0	ns
t _{PLH}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	5.0	1.5	7.5	ns
t _{PHL}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	5.0	1.5	8.5	ns

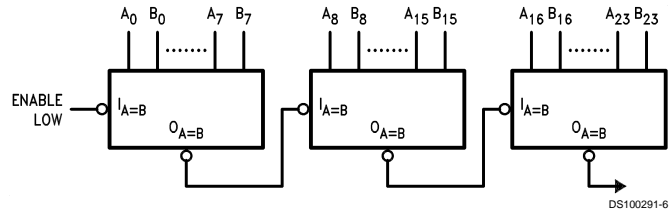
Note 9: Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

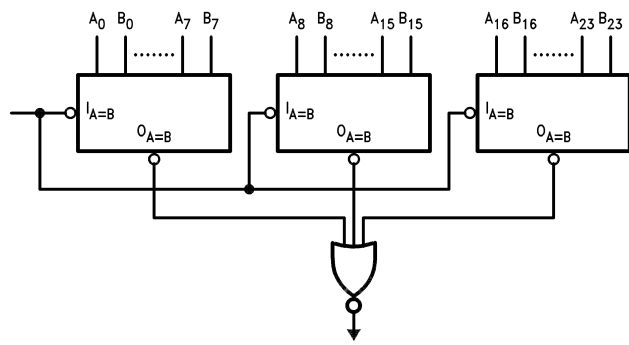
Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	40	pF	V _{CC} = 5.0V

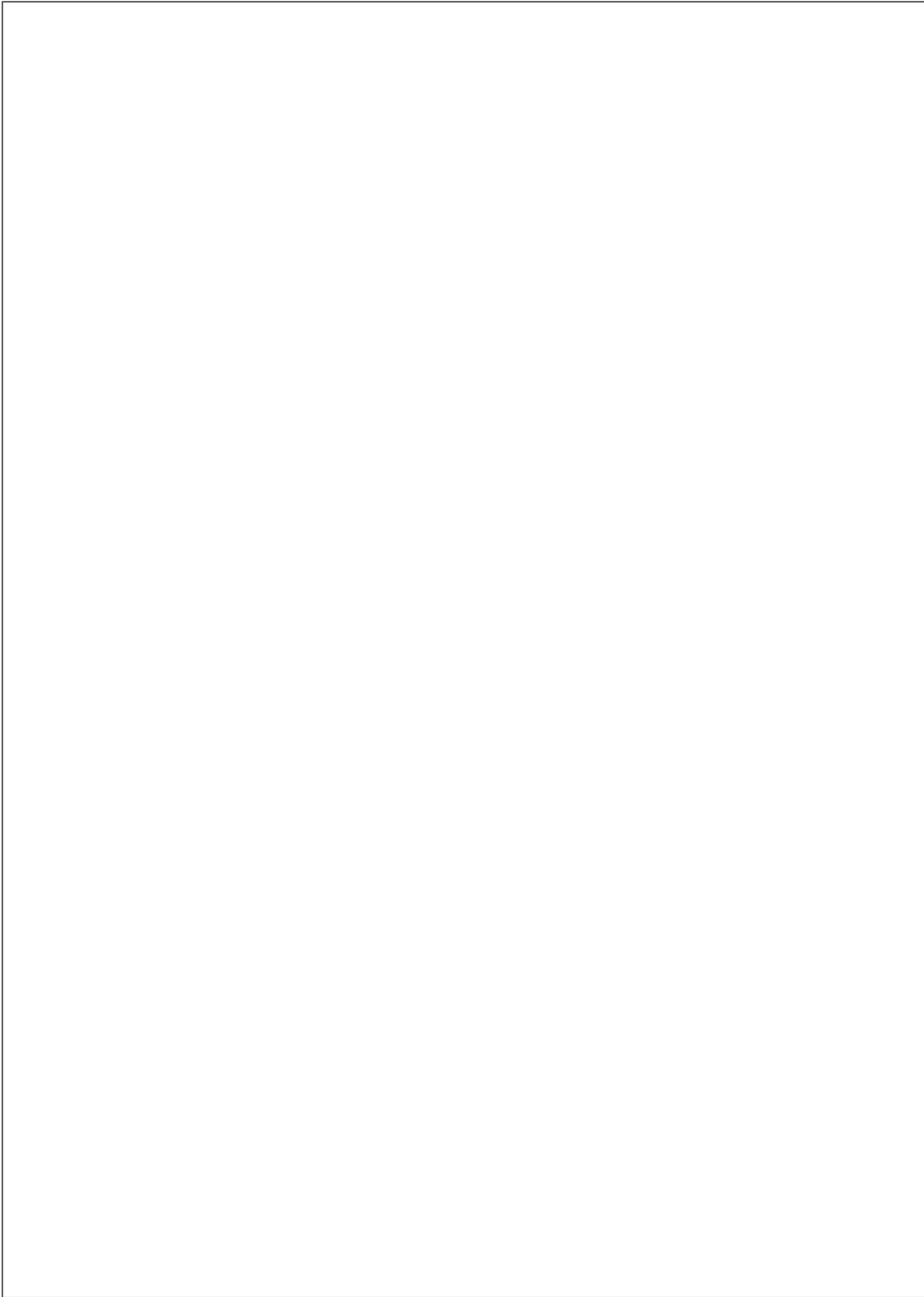
Applications

Ripple Expansion

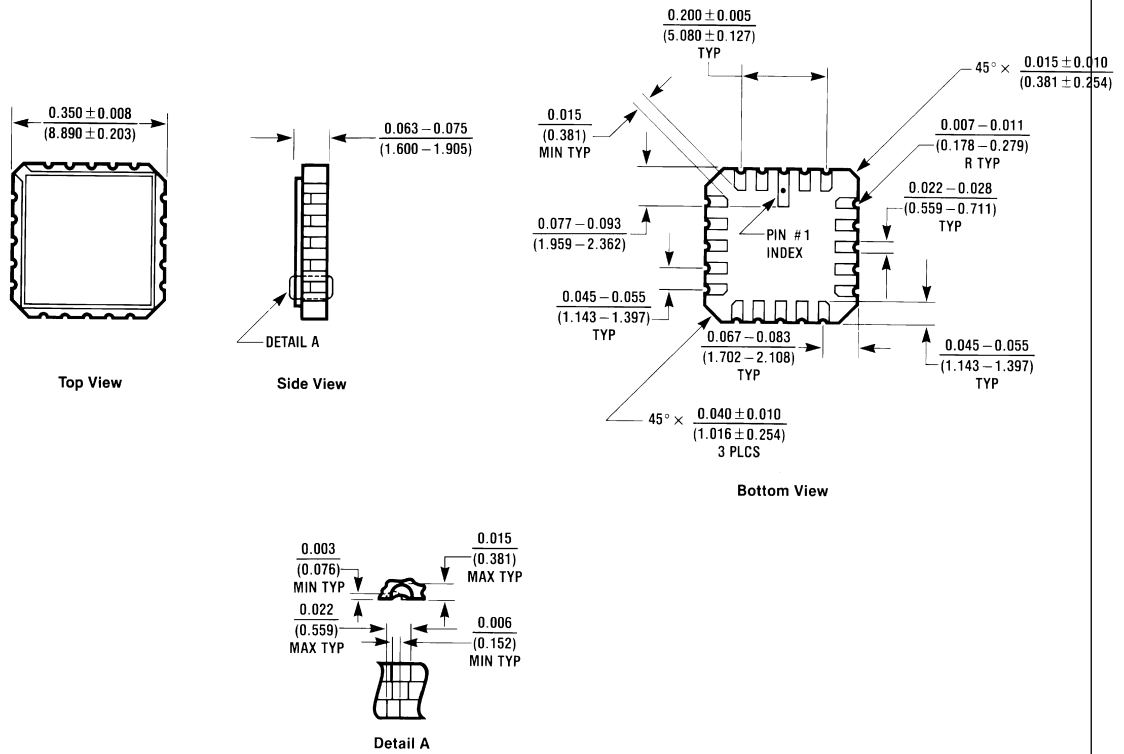


Parallel Expansion





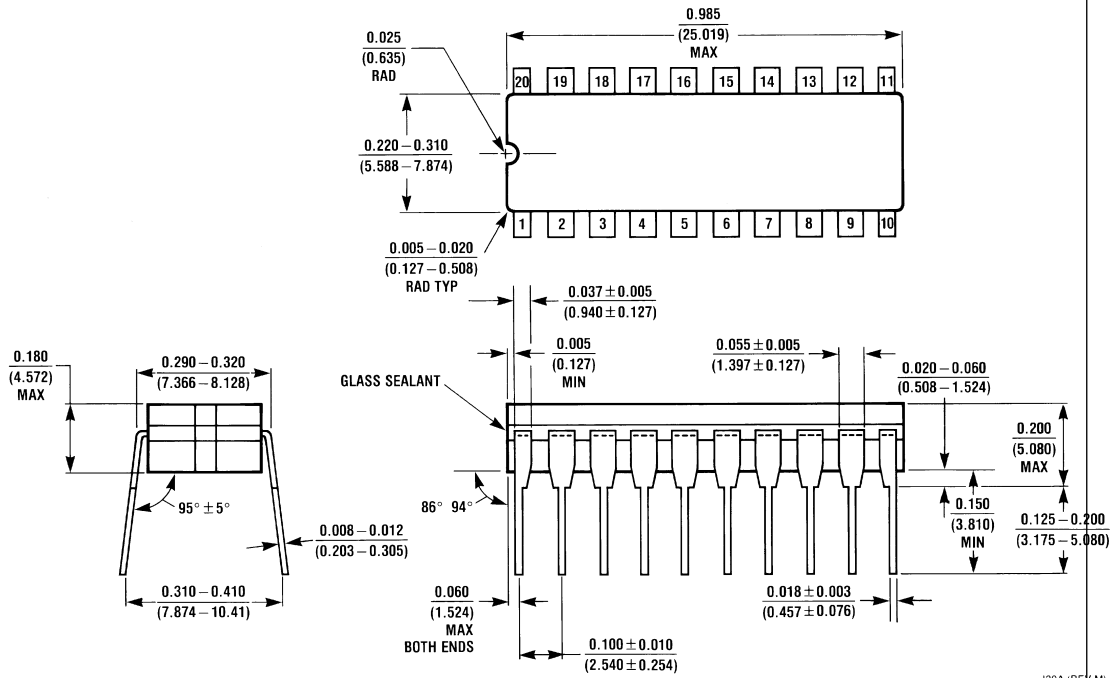
Physical Dimensions inches (millimeters) unless otherwise noted



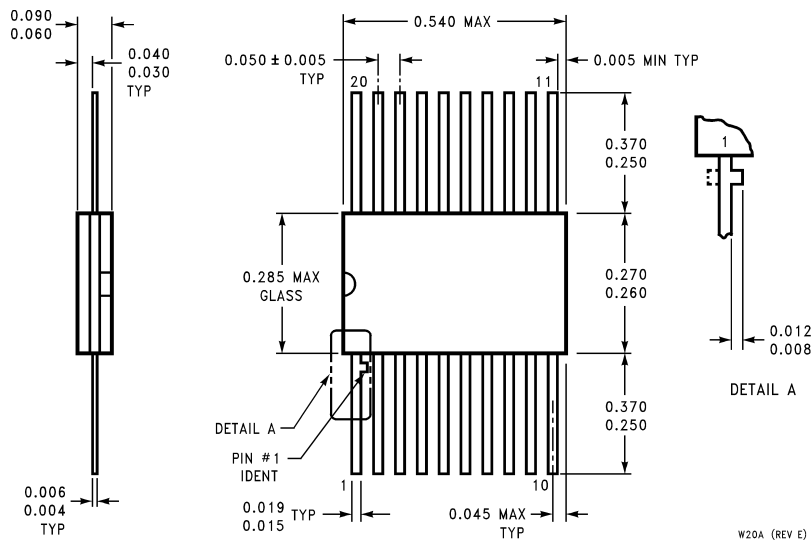
**20-Lead Ceramic Leadless Chip Carrier
Package Number E20A**

E20A (REV D)

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



**20-Lead Ceramic Dual-in-line
J20A**



**20-Lead Cerpack
Package Number W20A**

J20A (REV M)

W20A (REV E)

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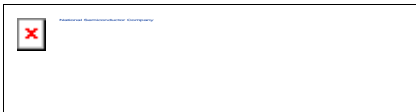
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


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The AC/ACT521 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.

Features




- I_{CC} reduced by 50%
 - Compares two 8-bit words in 6.5 ns typ
 - Expandable to any word length
 - Outputs source/sink 24 mA
 - ACT521 has TTL-compatible inputs
 - Standard microcircuit Drawing (SMD) 54AC521: 5962-90985 54ACT521: 5962-89793
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	Type	# pins		SPICE	IBIS		Quantity	\$US each		
5962-9098501M2A	LCC	20	Full production	N/A	N/A		50+	\$9.0000	tube of 50	[logo]çZçSç4çA 54AC521 LMQB /QçM\$E 5962- 9098501M2A
5962-9098501MRA	Cerdip	20	Full production	N/A	N/A		50+	\$8.0000	tube of 20	[logo]çZçSç4çA\$E 54AC521DMQB /QçM 5962-9098501MRA
5962-9098501MSA	Cerpack	20	Full production	N/A	N/A		50+	\$9.0000	tube of 19	[logo]çZçSç4çA\$E 54AC521FMQB QçM 5962- 9098501MSA
5962R9098501BRA	Cerdip	20	Full production	N/A	N/A	.	50+	\$84.0000	tube of 20	[logo]çZçSç4çA\$E 5962R9098501BRA 27014 Q
5962R9098501BSA	Cerpack	20	Full production	N/A	N/A	.	50+	\$90.0000	tube of 19	[logo]çZçSç4çA\$E 5962R9098501BSA 27014 Q

5962-9098501B2A	LCC	20	Full production	N/A	N/A		50+	\$10.5000	tube of 50	[logo] 5962-9098501B2A 27014 QS çZçSç4çA\$E
5962R9098501B2A	LCC	20	Full production	N/A	N/A	.	50+	\$79.0000	tube of 50	[logo] 5962R9098501B2A 27014 QS çZçSç4çA\$E
5962-9098501BSA	Cerpack	20	Full production	N/A	N/A	.	50+	\$9.0000	tube of 19	[logo]çZçSç4çA\$E 5962-9098501BSA 27014 QS
5962R9098501S2A	LCC	20	Full production	N/A	N/A	.	50+	\$138.0000	tube of 50	[logo]çZçSç4çA 27014 Q \$E 5962R 9098501S2A
5962R9098501SRA	Cerdip	20	Full production	N/A	N/A	.	50+	\$138.0000	tube of 20	[logo] çZçSç4çA\$E 5962R9098501SRA 27014 Q
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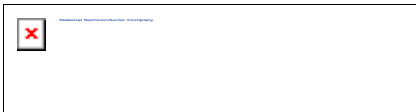
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
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
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5962-8979302RA	Cerdip	20	Full production	N/A	N/A	.	50+	\$8.0000	tube of 20	[logo]çZçSç4çA\$E 54ACT521DMQB /QçM 5962-8979302RA
5962-8979302SA	Cerpack	20	Full production	N/A	N/A	.	50+	\$9.0000	tube of 19	[logo]çZçSç4çA\$E 54ACT521FMQB QçM 5962- 8979302SA
54ACT521 MDA	die		Full production	N/A	N/A	.			N/A	-

Application Notes

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