

## 54F521 Comparator

8-Bit Identity Comparator

Military FAST Products

Product Specification

### FEATURES

- Compares two 8-bit words in 6.5ns typical
- Expandable to any word length

### DESCRIPTION

The 54F521 is an expandable 8-bit comparator. It compares two words of up to 8 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.

### ORDERING INFORMATION

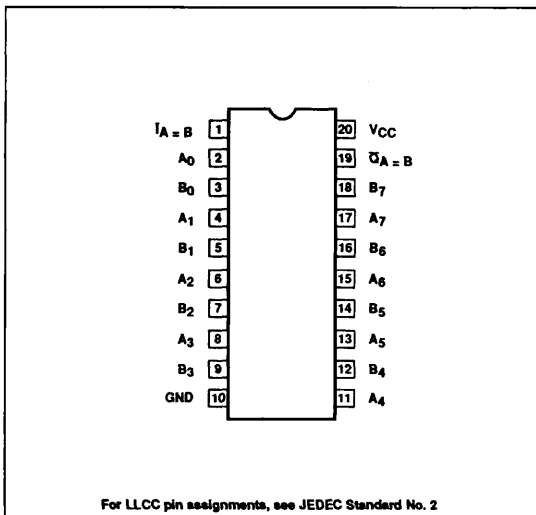
DESCRIPTION	ORDER CODE
20-Pin Ceramic DIP	54F521/BRA
20-Pin Ceramic FlatPack	54F521/BSA
20-Pin Ceramic LLCC	54F521/B2A

### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

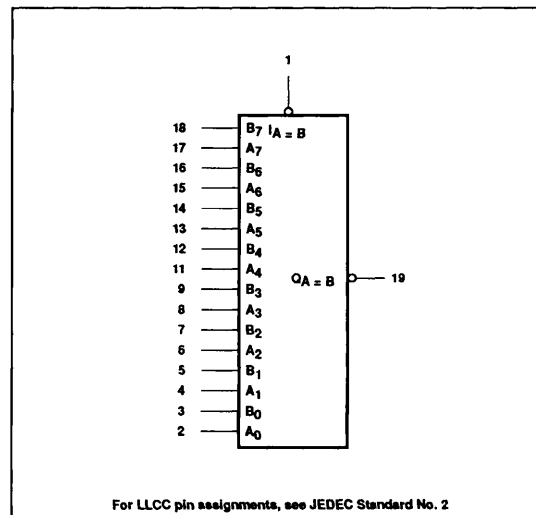
PINS	DESCRIPTION	54F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
$A_0 - A_7$	Word A inputs	1.0/1.0	20 $\mu$ A/0.6mA
$B_0 - B_7$	Word B inputs	1.0/1.0	20 $\mu$ A/0.6mA
$\bar{T}_{A=B}$	Expansion or enable input (active Low)	1.0/1.0	20 $\mu$ A/0.6mA
$\bar{Q}_{A=B}$	Identity output (active Low)	50/33	1.0mA/20mA

NOTE: One (1.0) FAST Unit Load (U.L.) is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

### PIN CONFIGURATION



### LOGIC SYMBOL



# Comparator

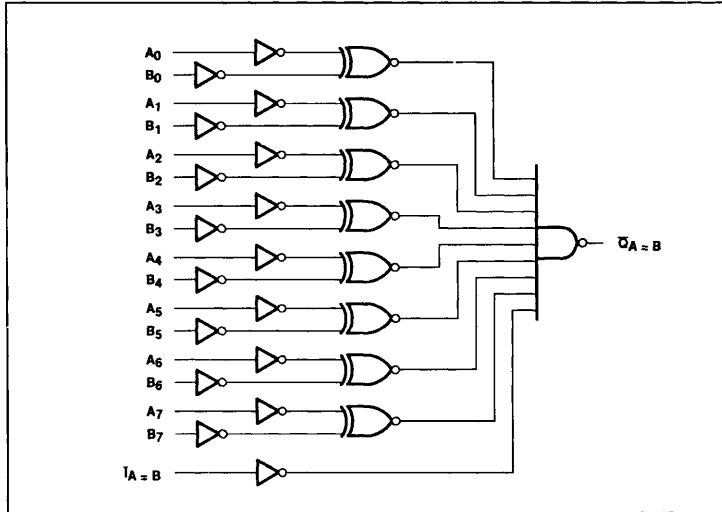
54F521

### TRUTH TABLE

INPUTS		OUTPUT
$I_{A=B}$	A, B	$Q_{A=B}$
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 DIAGRAM



### ABSOLUTE MAXIMUM RATINGS (Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V <sub>CC</sub>	Supply voltage range	-0.5 to +7.0	V
V <sub>I</sub>	Input voltage range	-0.5 to +7.0	V
I <sub>I</sub>	Input current range	-30 to +5	mA
V <sub>O</sub>	Voltage applied to output in High output state range	-0.5 to +V <sub>CC</sub>	V
I <sub>O</sub>	Current applied to output in Low output state	40	mA
T <sub>STG</sub>	Storage temperature range	-65 to +150	°C

### RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Nom	Max	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>IK</sub>	Input clamp current			-18	mA
I <sub>OH</sub>	High-level output current			-1	mA
I <sub>OL</sub>	Low-level output current			20	mA
T <sub>A</sub>	Operating free-air temperature range	-55		+125	°C

## Comparator

54F521

**DC ELECTRICAL CHARACTERISTICS** (Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT
			Min	Typ <sup>2</sup>	Max	
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = Min, V <sub>IL</sub> = Max, V <sub>IH</sub> = Min, I <sub>OH</sub> = Max	2.5			V
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = Min, V <sub>IH</sub> = Min, V <sub>IL</sub> = Max, I <sub>OL</sub> = Max		0.35	0.50	V
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = I <sub>IK</sub>		-0.73	-1.2	V
I <sub>IH2</sub>	Input current at maximum input voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 7.0V			100	μA
I <sub>IH1</sub>	High-level input current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V		1	20	μA
I <sub>IL</sub>	Low-level input current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.5V		-0.4	-0.6	mA
I <sub>OS</sub>	Short-circuit output current <sup>3</sup>	V <sub>CC</sub> = Max, V <sub>O</sub> = 0.0V	-60	-90	-150	mA
I <sub>CC</sub>	Supply current <sup>4</sup> (total)	V <sub>CC</sub> = Max		24	36	mA
			I <sub>CCH</sub>		15.5	23

**AC ELECTRICAL CHARACTERISTICS** (When measured in accordance with the procedures outlined in Signetics LOGIC App Note 202, "Testing and Specifying FAST Logic.")

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = +5.0V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay A <sub>n</sub> or B <sub>n</sub> to Q <sub>A=B</sub>	Waveform 1, 2	3.5 2.5	8.0 8.0	9.5 9.0	3.5 2.5	20.0 12.0	ns ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay I <sub>A=B</sub> to Q <sub>A=B</sub>	Waveform 2	3.0 3.5	5.0 6.5	6.5 7.0	3.0 3.5	12.0 9.0	ns ns

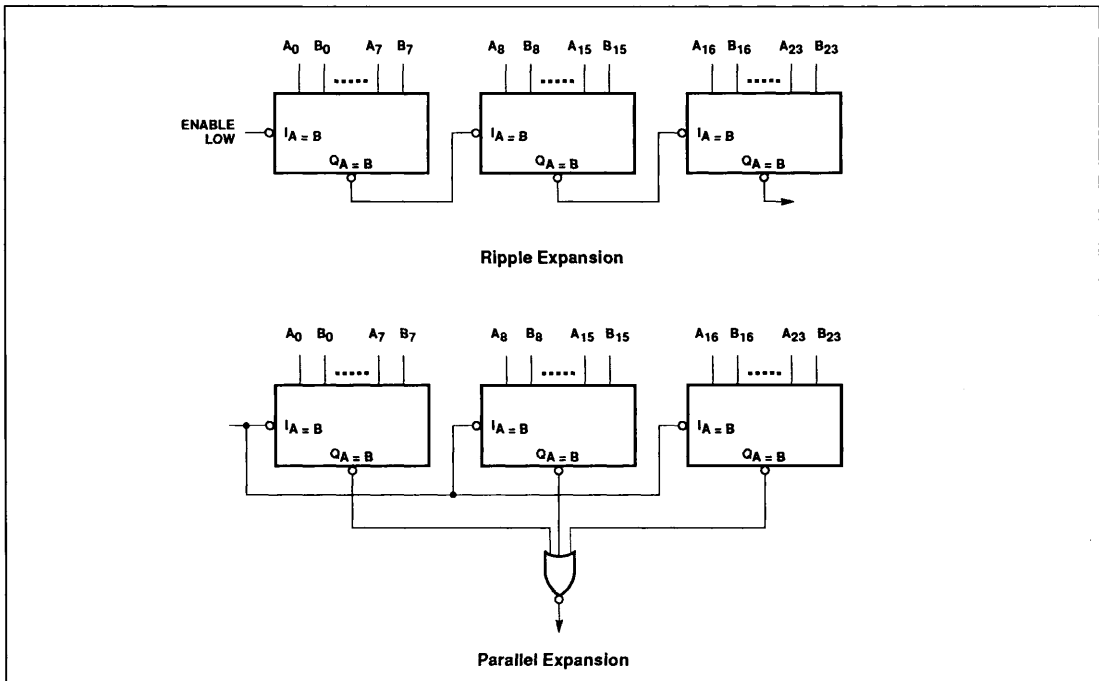
**NOTES:**

- For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type and function table for operating mode.
- All typical values are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.
- Not more than one output should be shorted at a time. For testing I<sub>OS</sub> the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests I<sub>OS</sub> tests should be performed last.
- For I<sub>CCH</sub> all inputs are grounded except B<sub>0</sub> can be any one input, which is at ≥ 4.0V. For I<sub>CCL</sub> all inputs are grounded.

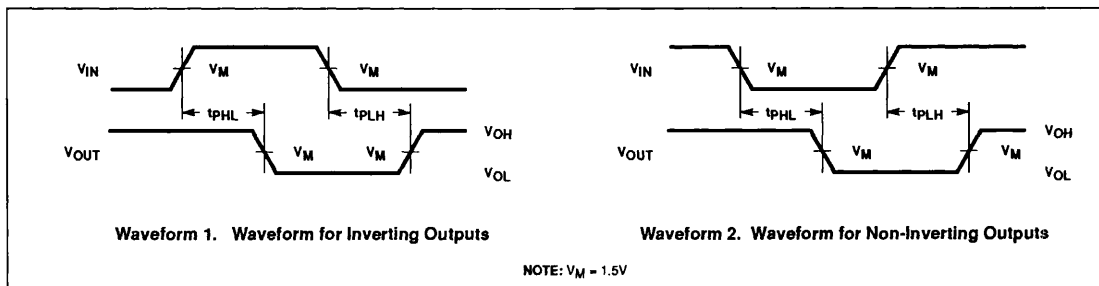
# Comparator

54F521

## APPLICATION DIAGRAMS



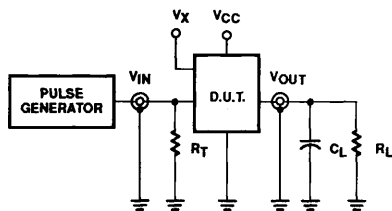
## AC WAVEFORMS



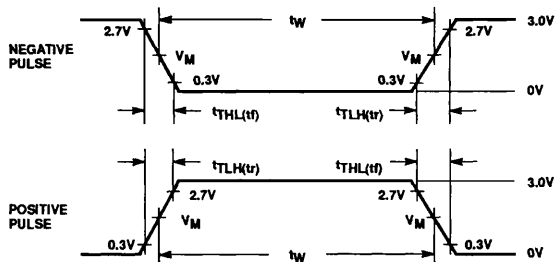
# Comparator

54F521

## TEST CIRCUIT AND WAVEFORMS



Test Circuit for Totem-Pole Outputs



$V_M = 1.5V$

Input Pulse Definition

**DEFINITIONS:**

- $R_L$  = Load Resistor; see AC Characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC Characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.
- $V_X$  = Unlocked pins must be held at:  $\leq 0.8V$ ;  $\geq 2.7V$  or open per Function Table.

INPUT PULSE CHARACTERISTICS				
Family	Rep. Rate	Pulse Width	$t_{TLH}$	$t_{THL}$
54F	1MHz	500ns	$\leq 2.5ns$	$\leq 2.5ns$