

74F524 8-Bit Registered Comparator

General Description

The 74F524 is an 8-bit bidirectional register with parallel input and output plus serial input and output progressing from LSB to MSB. All data inputs, serial and parallel, are loaded by the rising edge of the input clock. The device functions are controlled by two control lines (S_0 , S_1) to execute shift, load, hold and read out.

An 8-bit comparator examines the data stored in the registers and on the data bus. Three true-HIGH, open-collector outputs representing "register equal to bus", "register greater than bus" and "register less than bus" are provided. These outputs can be disabled to the OFF state by the use of Status Enable (\overline{SE}). A mode control has also been provided to allow twos complement as well as magnitude compare. Linking inputs are provided for expansion to longer words.

Features

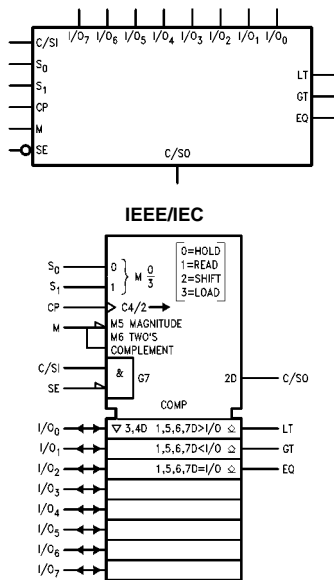
- 8-Bit bidirectional register with bus-oriented input-output
- Independent serial input-output to register
- Register bus comparator with "equal to", "greater than" and "less than" outputs
- Cascadable in groups of eight bits
- Open-collector comparator outputs for AND-wired expansion
- Twos complement or magnitude compare

Ordering Code:

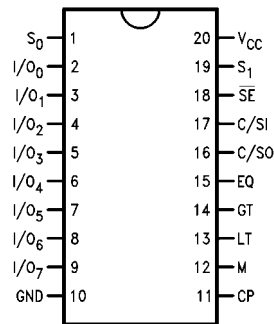
Order Number	Package Number	Package Description
74F524SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
74F524PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbols



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	U.L.	
		HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
S_0, S_1	Mode Select Inputs	1.0/1.0	20 μA / -0.6 mA
C/SI	Status Priority or Serial Data Input	1.0/1.0	20 μA / -0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 μA / -0.6 mA
\overline{SE}	Status Enable Input (Active LOW)	1.0/1.0	20 μA / -0.6 mA
M	Compare Mode Select Input	1.0/1.0	20 μA / -0.6 mA
$I/O_0-I/O_7$	Parallel Data Inputs or 3-STATE Parallel Data Outputs	3.5/1.083 150/40 (33.3)	70 μA / -0.65 mA -3 mA / 24 mA (20 mA)
C/SO	Status Priority or Serial Data Output	50/33.3	-1 mA / 20 mA
LT	Register Less Than Bus Output	OC (Note 1) / 33.3	(Note 1) / 20 mA
EQ	Register Equal Bus Output	OC (Note 1) / 33.3	(Note 1) / 20 mA
GT	Register Greater Than Bus Output	OC (Note 1) / 33.3	(Note 1) / 20 mA

Note 1: OC = Open Collector

Number Representation Select Table

M	Operation
L	Magnitude Compare
H	Twos Complement Compare

Select Truth Table

S_0	S_1	Operation
L	L	Hold—Retains Data in Shift Register
L	H	Read—Read Contents in Register onto Data Bus, Data Remains in Register Unaffected by Clock
H	L	Shift—Allows Serial Shifting on Next Rising Clock Edge
H	H	Load—Load Data on Bus into Register

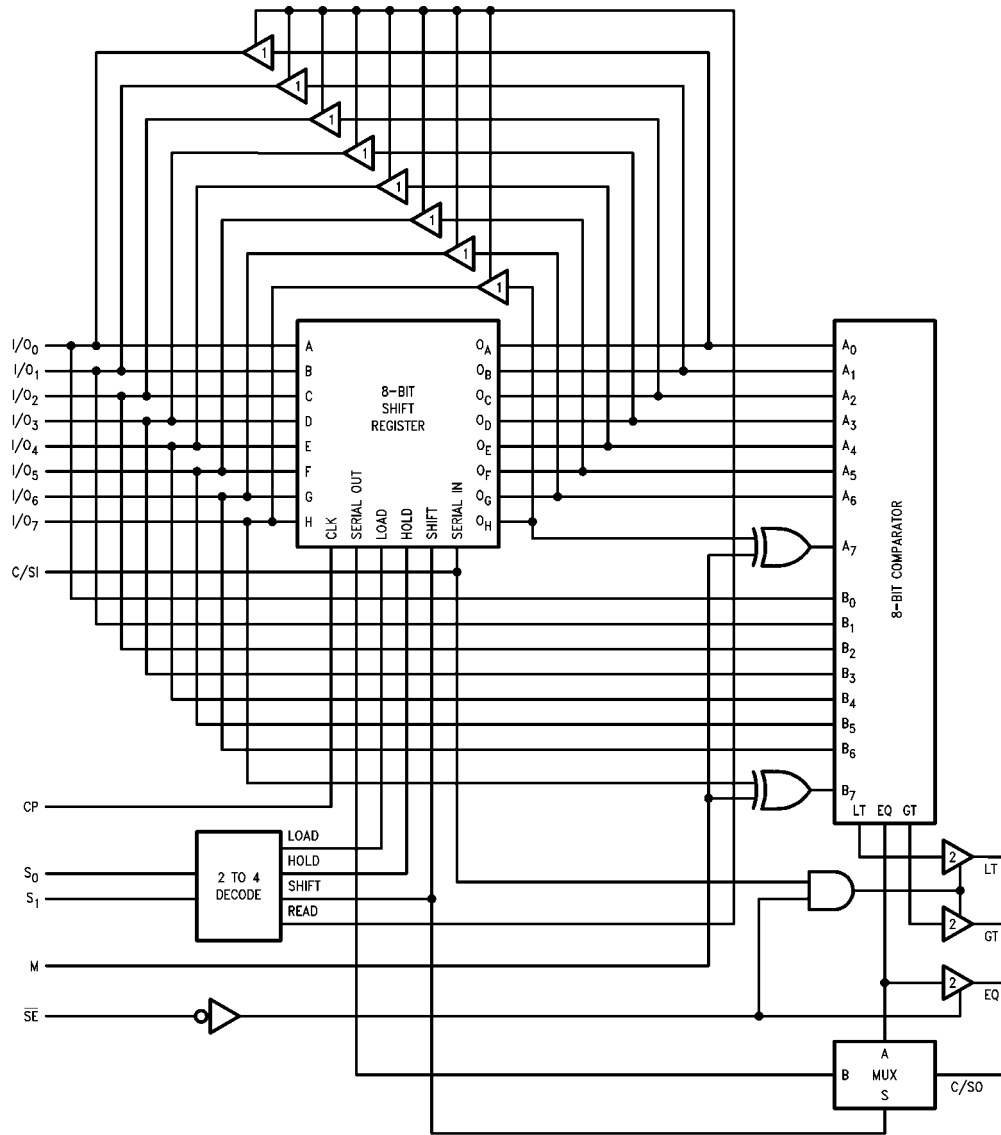
Status Truth Table

(Hold Mode)

Inputs			Outputs			
\overline{SE}	C/SI	Data Comparison	EQ	GT	LT	C/SO
H	H	X	H	H	H	1
L	L	$O_A-O_H > I/O_0-I/O_7$	L	H	H	L
X	L	$O_A-O_H = I/O_0-I/O_7$	H	H	H	L
H	L	$O_A-O_H < I/O_0-I/O_7$	L	H	H	L
H	H	$O_A-O_H > I/O_0-I/O_7$	L	H	L	L
H	H	$O_A-O_H = I/O_0-I/O_7$	H	L	L	H
L	H	$O_A-O_H < I/O_0-I/O_7$	L	L	H	L

1 = HIGH if data are equal, otherwise LOW
 H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial

Block Diagram



Notes:

- 1. 3-STATE Output
- 2. Open-Collector Output

Absolute Maximum Ratings (Note 2)

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +150°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 3)	-0.5V to +7.0V
Input Current (Note 3)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	
Standard Output	-0.5V to V _{CC}
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I _{OL} (mA)

Recommended Operating Conditions

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

Note 2: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 3: Either voltage limit or current limit is sufficient to protect inputs.

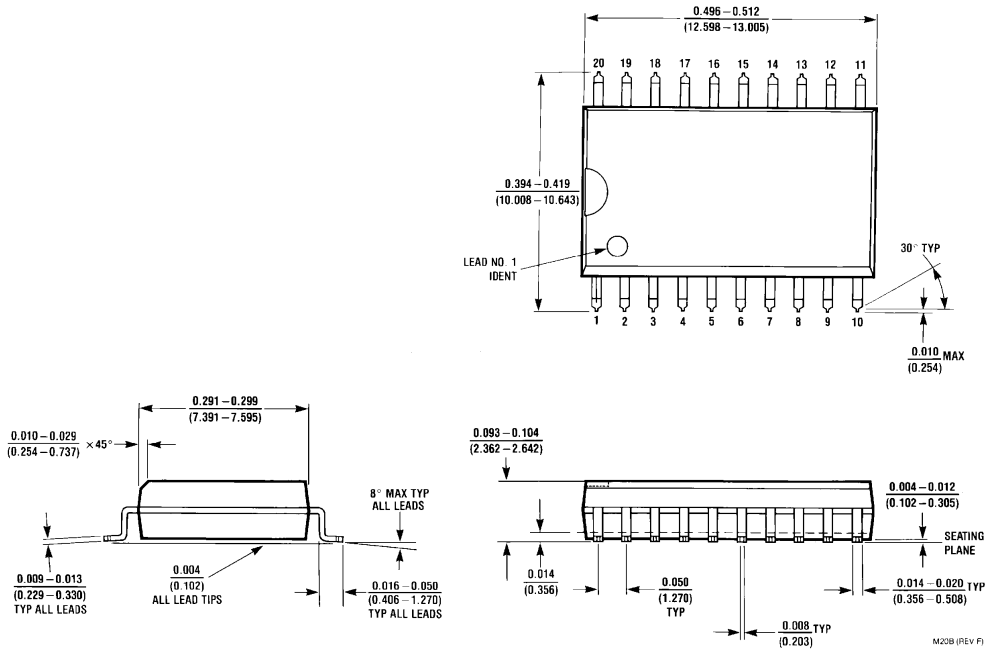
DC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Units	V _{CC}	Conditions
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	10% V _{CC} 2.5 10% V _{CC} 2.4 5% V _{CC} 2.7 5% V _{CC} 2.7			V	Min	I _{OH} = -1 mA I _{OH} = -3 mA I _{OH} = -1 mA I _{OH} = -3 mA
V _{OL}	Output LOW Voltage	10% V _{CC} 10% V _{CC}		0.5 0.5	V	Min	I _{OL} = 20 mA (I/O _n) I _{OL} = 24 mA (LT, GT, EQ, C/SO)
I _{IH}	Input HIGH Current			5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test			7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current			50	μA	Max	V _{OUT} = V _{CC} (I/O _n , C/SO)
V _{ID}	Input Leakage Test	4.75			V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current			3.75	μA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V
I _{IH} + I _{OZH}	Output Leakage Current			70	μA	Max	V _{IO} = 2.7V
I _{IL} + I _{OZL}	Output Leakage Current			-650	μA	Max	V _{IO} = 0.5V
I _{OS}	Output Short-Circuit Current	-60		-150	mA	Max	V _{OUT} = 0V
I _{OHC}	Open Collector, Output OFF Leakage Test			250	μA	Min	V _{OUT} = V _{CC}
I _{CCH}	Power Supply Current		128	180	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		128	180	mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current		128	180	mA	Max	V _O = HIGH Z

AC Electrical Characteristics							
Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A = 0°C to +70°C V _{CC} = +5.0V C _L = 50 pF		Units
		Min	Typ	Max	Min	Max	
f _{MAX}	Maximum Shift Frequency	50	75		50		MHz
t _{PLH}	Propagation Delay	9.0	16.5	20.0	9.0	21.0	ns
t _{PHL}	I/O _n to EQ	5.0	9.5	12.0	5.0	13.0	
t _{PLH}	Propagation Delay	8.5	14.1	19.0	8.5	20.0	
t _{PHL}	I/O _n to GT	6.5	13.0	16.5	6.5	17.5	
t _{PLH}	Propagation Delay	7.0	15.5	20.0	7.0	21.0	ns
t _{PHL}	I/O _n to LT	4.5	10.0	14.0	4.5	15.0	
t _{PLH}	Propagation Delay	8.0	15.2	19.5	8.0	20.5	ns
t _{PHL}	I/O _n to C/SO	6.0	12.5	16.0	6.0	17.0	
t _{PLH}	Propagation Delay	10.0	20.0	25.0	10.0	26.0	ns
t _{PHL}	CP to EQ	4.0	8.5	16.5	4.0	17.5	
t _{PLH}	Propagation Delay	10.0	16.5	21.0	10.0	22.0	
t _{PHL}	CP to GT	8.5	17.0	22.0	8.5	23.0	
t _{PLH}	Propagation Delay	9.0	20.0	25.0	9.0	26.0	ns
t _{PHL}	CP to LT	5.5	13.5	17.0	5.5	18.0	
t _{PLH}	Propagation Delay	8.5	16.5	21.0	8.5	22.0	ns
t _{PHL}	CP to C/SO (Load)						
t _{PLH}	Propagation Delay	5.0	10.0	13.0	5.0	14.0	ns
t _{PHL}	CP to C/SO (Serial Shift)	4.5	9.0	11.5	4.5	12.5	
t _{PLH}	Propagation Delay	9.0	15.0	19.0	9.0	20.0	ns
t _{PHL}	C/SI to GT	3.0	6.5	8.5	3.0	9.5	
t _{PLH}	Propagation Delay	8.0	15.5	20.0	8.0	21.0	ns
t _{PHL}	C/SI to LT	3.5	6.5	8.5	3.5	9.5	
t _{PLH}	Propagation Delay	6.5	11.5	14.5	6.5	15.5	ns
t _{PHL}	S ₀ , S ₁ to C/SO	5.5	14.0	18.0	5.5	19.0	
t _{PLH}	Propagation Delay	3.5	8.0	10.5	3.5	11.5	ns
t _{PHL}	SE to EQ	2.5	6.0	8.0	2.5	9.0	
t _{PLH}	Propagation Delay	6.5	12.5	16.0	6.5	17.0	
t _{PHL}	SE to GT	3.5	6.0	8.0	3.5	9.0	
t _{PLH}	Propagation Delay	5.0	10.5	13.5	5.0	14.5	ns
t _{PHL}	SE to LT	3.5	6.0	8.0	3.5	9.0	
t _{PLH}	Propagation Delay	4.0	8.5	11.0	4.0	12.0	ns
t _{PHL}	C/SI to C/SO	4.0	8.5	11.0	4.0	12.0	
t _{PLH}	Propagation Delay	8.0	15.0	19.5	8.0	20.5	ns
t _{PHL}	M to GT	6.0	12.0	17.5	6.0	18.5	
t _{PLH}	Propagation Delay	8.0	17.0	22.0	8.0	23.0	ns
t _{PHL}	M to LT	4.5	9.5	12.0	4.5	13.0	
t _{PLH}	Propagation Delay	15.0	25.0	33.0	15.0	35.0	ns
t _{PHL}	S ₀ , S ₁ to EQ	9.0	15.0	19.0	9.0	20.0	
t _{PLH}	Propagation Delay	10.5	18.0	23.0	10.5	24.0	
t _{PHL}	S ₀ , S ₁ to GT	10.5	18.0	23.0	10.5	24.0	
t _{PLH}	Propagation Delay	13.0	22.0	28.0	13.0	30.0	ns
t _{PHL}	S ₀ , S ₁ to LT	12.0	19.0	24.0	12.0	25.0	
t _{PZH}	Output Enable Time	4.5	10.0	13.0	4.5	14.0	ns
t _{PZL}	S ₀ , S ₁ to I/O _n	5.5	11.0	15.0	5.5	16.0	
t _{PHZ}	Output Disable Time	3.5	8.0	12.0	3.5	13.0	
t _{PLZ}	S ₀ , S ₁ to I/O _n	4.5	9.6	12.5	4.5	13.5	

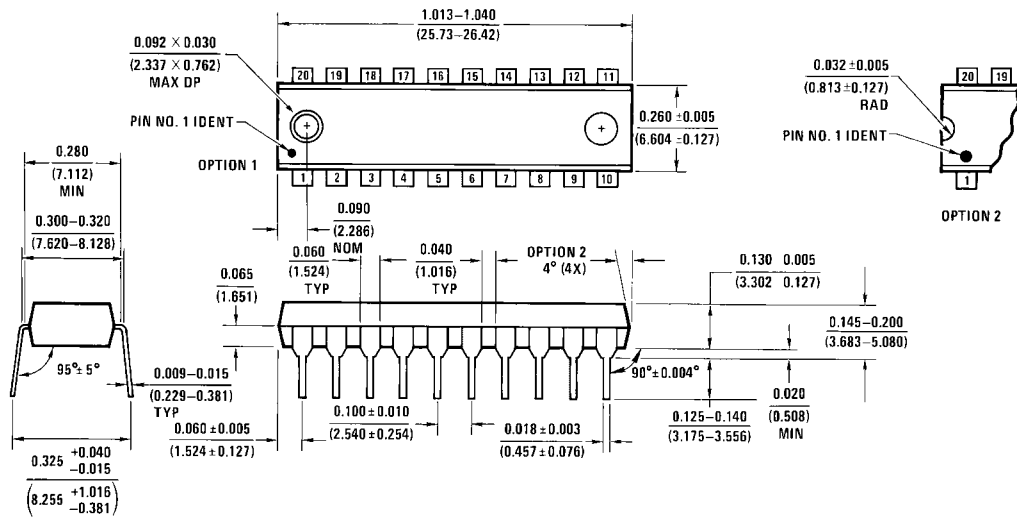
AC Operating Requirements						
Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V		T _A = 0°C to +70°C V _{CC} = +5.0V		Units
		Min	Max	Min	Max	
t _S (H)	Setup Time, HIGH or LOW	6.0		6.0		ns
t _S (L)	I/O _n to CP	6.0		6.0		
t _H (H)	Hold Time, HIGH or LOW	0		0		ns
t _H (L)	I/O _n to CP	0		0		
t _S (H)	Setup Time, HIGH or LOW	10.0		10.0		ns
t _S (L)	S ₀ or S ₁ to CP	10.0		10.0		
t _H (H)	Hold Time, HIGH or LOW	0		0		ns
t _H (L)	S ₀ or S ₁ to CP	0		0		
t _S (H)	Setup Time, HIGH or LOW	7.0		7.0		ns
t _S (L)	C/SI to CP	7.0		7.0		
t _H (H)	Hold Time, HIGH or LOW	0		0		ns
t _H (L)	C/SI to CP	0		0		
t _V (H)	Clock Pulse Width, HIGH	5.0		5.0		ns

Physical Dimensions inches (millimeters) unless otherwise noted



**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M20B**

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



N20A (REV G)

20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N20A

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

LIFE SUPPORT POLICY

FAIRCHILD'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 FAIRCHILD 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 (c) 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.

www.fairchildsemi.com