

74F148 8-Line to 3-Line Priority Encoder

General Description

The 'F148 provides three bits of binary coded output representing the position of the highest order active input, along with an output indicating the presence of any active input. It is easily expanded via input and output enables to provide priority encoding over many bits.

- Provides 3-bit binary priority code
- Input enable capability
- Signals when data is present on any input
- Cascadable for priority encoding of n bits

Features

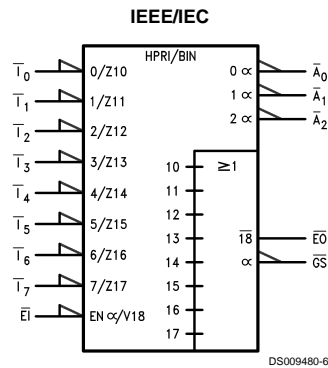
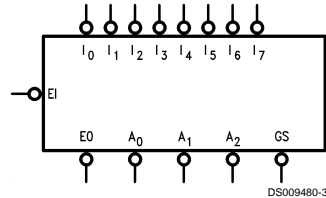
- Encodes eight data lines in priority

Ordering Code:

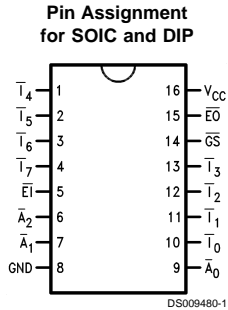
Commercial	Package Number	Package Description
74F148PC	N16E	16-Lead (0.300" Wide) Molded Dual-In-Line
74F148SC (Note 1)	M16A	16-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F148SJ (Note 1)	M16D	16-Lead (0.300" Wide) Molded Small Outline, EIAJ

Note 1: Devices also available in 13" reel. Use Suffix = SCX and SJX.

Logic Symbols



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
\bar{I}_0	Priority Input (Active LOW)	1.0/1.0	20 μ A/-0.6 mA
\bar{I}_1 - \bar{I}_7	Priority Inputs (Active LOW)	1.0/2.0	20 μ A/-1.2 mA
$\bar{E}I$	Enable Input (Active LOW)	1.0/1.0	20 μ A/-0.6 mA
$\bar{E}O$	Enable Output (Active LOW)	50/33.3	-1 mA/20 mA
$\bar{G}S$	Group Signal Output (Active LOW)	50/33.3	-1 mA/20 mA
\bar{A}_0 - \bar{A}_2	Address Outputs (Active LOW)	50/33.3	-1 mA/20 mA

Functional Description

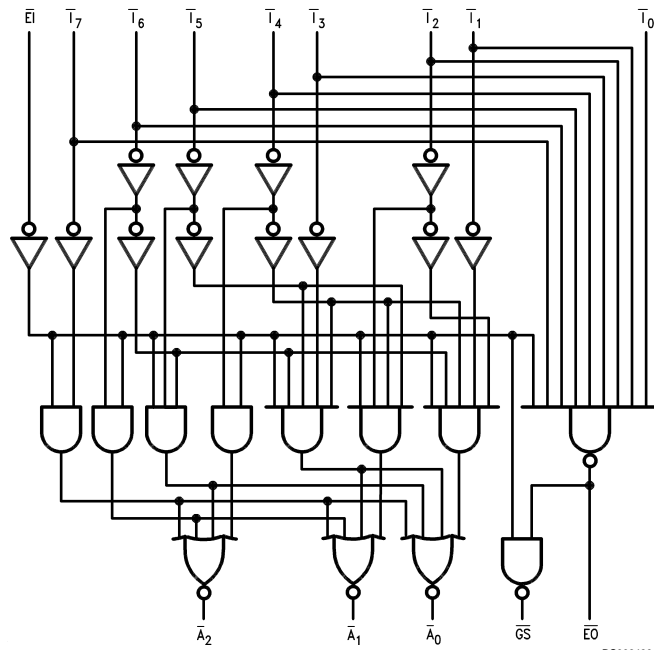
The 'F148 8-input priority encoder accepts data from eight active LOW inputs (\bar{I}_0 - \bar{I}_7) and provides a binary representation on the three active LOW outputs. A priority is assigned to each input so that when two or more inputs are simultaneously active, the input with the highest priority is represented on the output, with input line 7 having the highest priority. A HIGH on the Enable Input ($\bar{E}I$) will force all outputs to the inactive (HIGH) state and allow new data to settle without producing erroneous information at the outputs. A Group Signal output ($\bar{G}S$) and Enable Output ($\bar{E}O$) are provided along with the three priority data outputs (\bar{A}_2 , \bar{A}_1 , \bar{A}_0). $\bar{G}S$ is active LOW when any input is LOW: this indicates when any input is active. $\bar{E}O$ is active LOW when all inputs are HIGH. Using the Enable Output along with the Enable Input allows cascading for priority encoding on any number of input signals. Both $\bar{E}O$ and $\bar{G}S$ are in the inactive HIGH state when the Enable Input is HIGH.

Truth Table

$\bar{E}I$	Inputs								Outputs				
	\bar{I}_0	\bar{I}_1	\bar{I}_2	\bar{I}_3	\bar{I}_4	\bar{I}_5	\bar{I}_6	\bar{I}_7	$\bar{G}S$	\bar{A}_0	\bar{A}_1	\bar{A}_2	$\bar{E}O$
H	X	X	X	X	X	X	X	X	H	H	H	H	H
L	H	H	H	H	H	H	H	H	H	H	H	H	L
L	X	X	X	X	X	X	X	L	L	L	L	L	H
L	X	X	X	X	X	X	L	H	L	H	L	L	H
L	X	X	X	X	L	H	H	H	L	H	H	L	H
L	X	X	X	L	H	H	H	H	L	L	L	H	H
L	X	X	L	H	H	H	H	H	L	L	H	H	H
L	L	H	H	H	H	H	H	H	L	H	H	H	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



DS009480-4

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	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +175°C
Plastic	-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	
Commercial	0°C to +70°C
Supply Voltage	
Commercial	+4.5V to +5.5V

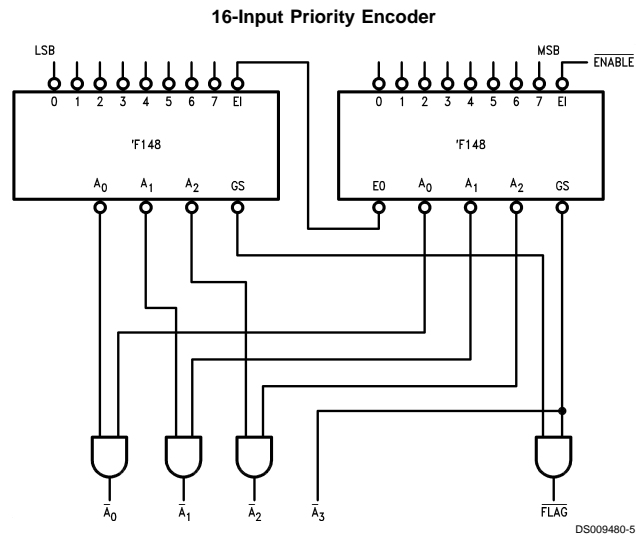
Note 2: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

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

DC Electrical Characteristics

Symbol	Parameter	74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
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	74F 10% V _{CC}	2.5		V	Min	I _{OH} = -1 mA
		74F 5% V _{CC}	2.7				I _{OH} = -1 mA
V _{OL}	Output LOW Voltage	74F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA
I _{IH}	Input HIGH Current	74F		5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test	74F		7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output High Leakage Current	74F		50	μA	Max	V _{OUT} = V _{CC}
V _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F		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 ₀ , E _I)
				-1.2	mA		V _{IN} = 0.5V (I ₁ -I ₇)
I _{OS}	Output Short-Circuit Current		-60	-150	mA	Max	V _{OUT} = 0V
I _{CCH}	Power Supply Current			35	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current			35	mA	Max	V _O = LOW

Application

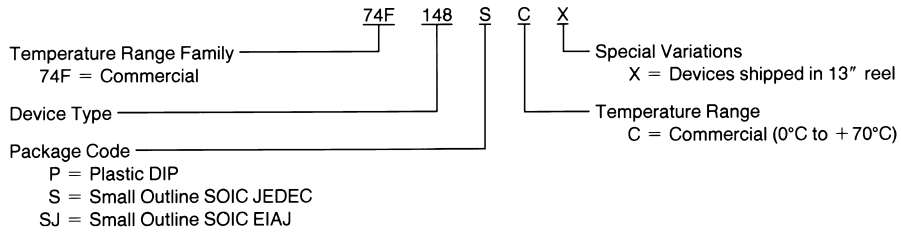


AC Electrical Characteristics

Symbol	Parameter	74F			74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$		
		Min	Typ	Max	Min	Max	
t_{PLH}	Propagation Delay	3.0	7.0	9.0	3.0	10.0	ns
t_{PHL}	\bar{I}_n to \bar{A}_n	3.0	8.0	10.5	3.0	12.0	
t_{PLH}	Propagation Delay	2.5	5.0	6.5	2.5	7.5	ns
t_{PHL}	\bar{I}_n to $\bar{E}O$	2.5	5.5	7.5	2.5	8.5	
t_{PLH}	Propagation Delay	2.5	7.0	9.0	2.5	10.0	ns
t_{PHL}	\bar{I}_n to $\bar{G}S$	2.5	6.0	8.0	2.5	9.0	
t_{PLH}	Propagation Delay	2.5	6.5	8.5	2.5	9.5	ns
t_{PHL}	$\bar{E}I$ to \bar{A}_n	2.5	6.0	8.0	2.5	9.0	
t_{PLH}	Propagation Delay	2.5	5.0	7.0	2.5	8.0	ns
t_{PHL}	$\bar{E}I$ to $\bar{G}S$	2.5	6.0	7.5	2.5	8.5	
t_{PLH}	Propagation Delay	2.5	5.5	7.0	2.5	8.0	ns
t_{PHL}	$\bar{E}I$ to $\bar{E}O$	3.0	8.0	10.5	3.0	12.0	

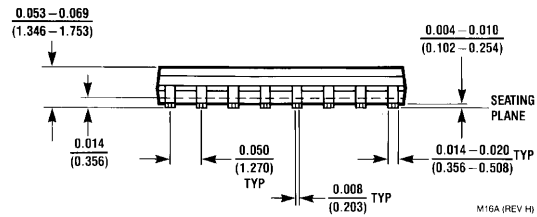
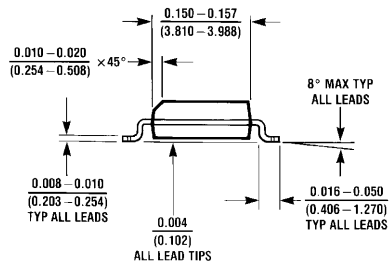
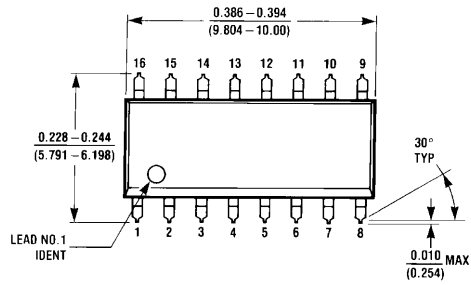
Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



DS009480-7

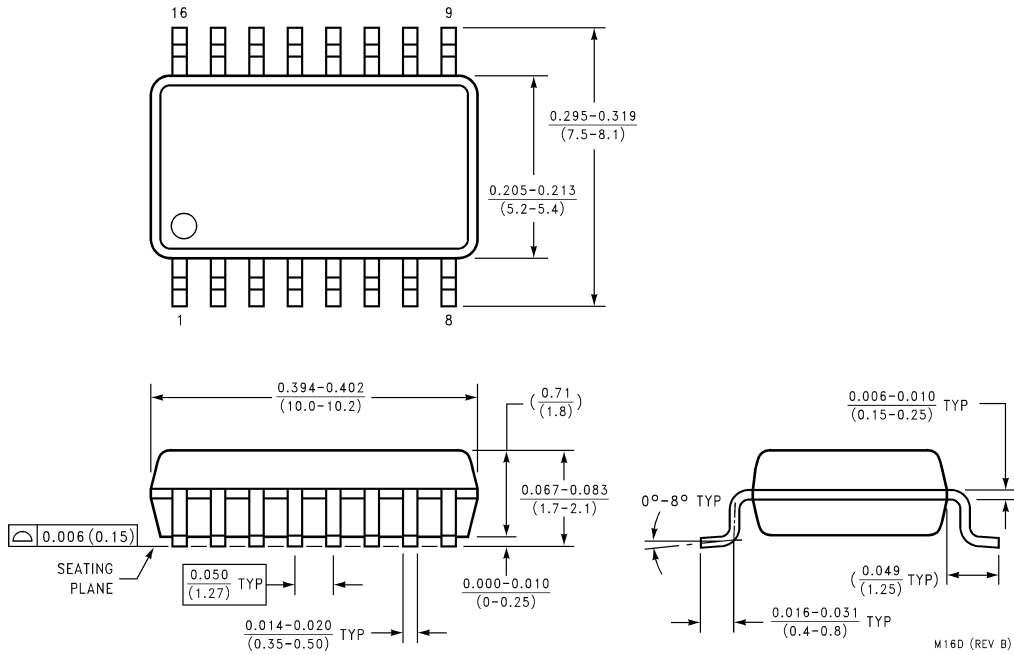
Physical Dimensions inches (millimeters) unless otherwise noted



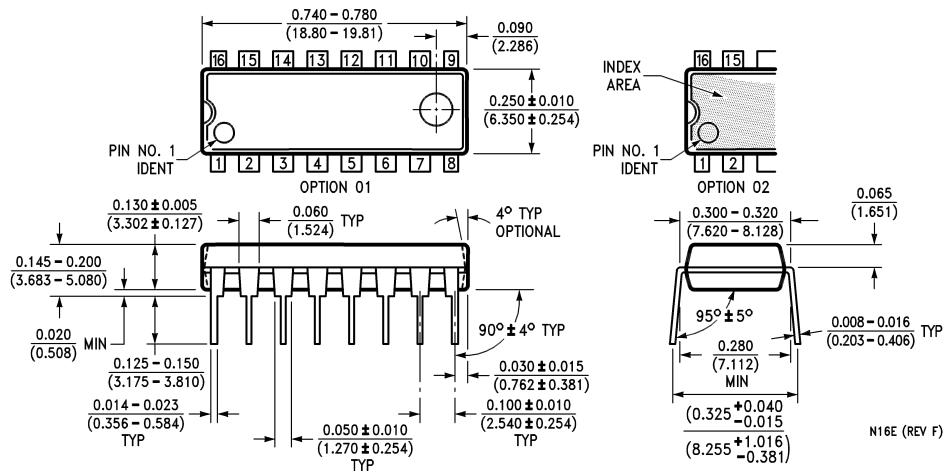
M16A (REV H)

**16-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
Package Number M16A**

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



**16-Lead (0.150" Wide) Molded Small Outline Package, EIAJ (SJ)
Package Number M16D**



**16-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
Package Number N16E**

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.

Fairchild Semiconductor Corporation Americas
Customer Response Center
Tel: 1-888-522-5372

Fairchild Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 8 141-35-0
English Tel: +44 (0) 1 793-85-68-56
Italy Tel: +39 (0) 2 57 5631

Fairchild Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: +852 2737-7200
Fax: +852 2314-0061

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

www.fairchildsemi.com