

74F148 8-Line to 3-Line Priority Encoder

General Description

The 74F148 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

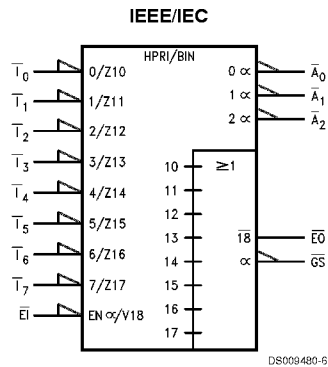
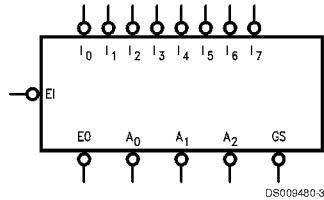
- Encodes eight data lines in priority

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 |

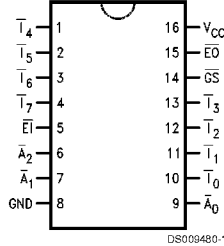
Note 1: Devices also available in 13" reel. Use Suffix = SCX and SJX.

Logic Symbols



Connection Diagram

Pin Assignment
for SOIC and DIP



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 μA / -0.6 mA |
| \bar{I}_1 – \bar{I}_7 | Priority Inputs (Active LOW) | 1.0/2.0 | 20 μA / -1.2 mA |
| $\bar{E}I$ | Enable Input (Active LOW) | 1.0/1.0 | 20 μA / -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

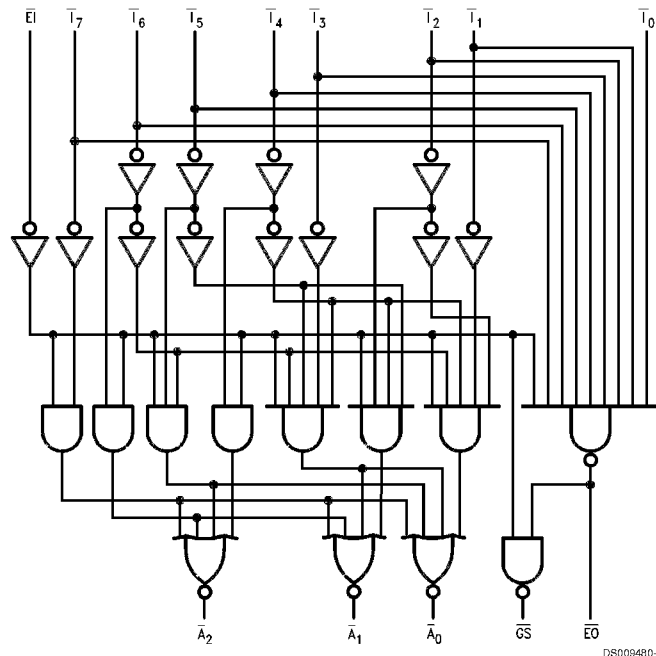
The 'F148 8-input priority encoder accepts data from eight active LOW inputs (\bar{I}_0 – \bar{I}_7) and provides a binary representation on the three active LOW outputs. A priority is assigned to each input so that when two or more inputs are simultaneously active, the input with the highest priority 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 | X | L | H | H | L | L | 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



DS008480-4

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 |

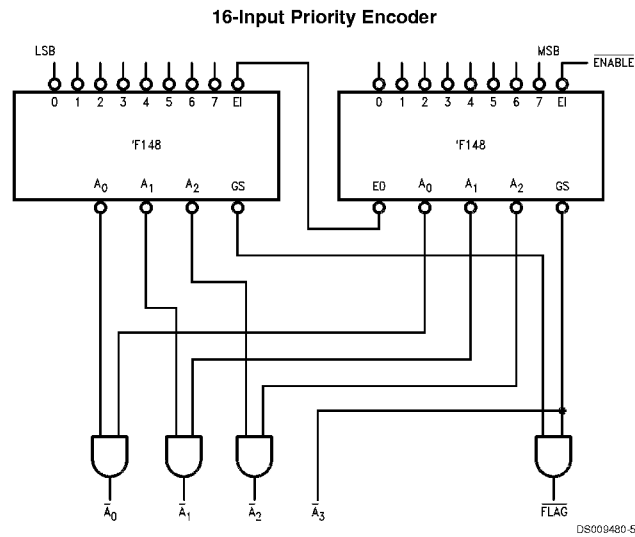
Note 2: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

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 | | | | |
| 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 _O , E _I) V _{IN} = 0.5V (I ₁ -I ₇) |
| | | | -1.2 | | mA | | |
| 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

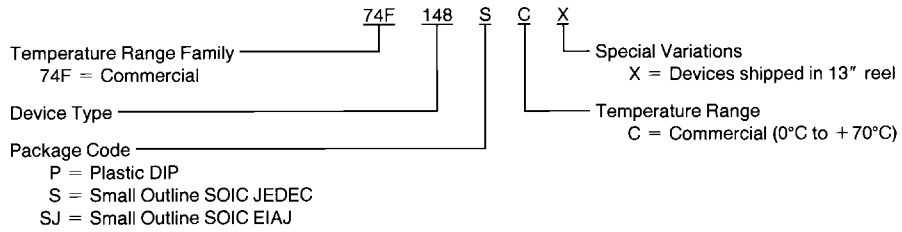


AC Electrical Characteristics

| Symbol | Parameter | 74F | | | 74F | | Units |
|------------------|----------------------------------|---|-----|------|--|------|-------|
| | | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A , V _{CC} = Com C _L = 50 pF | | |
| | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 3.0 | 7.0 | 9.0 | 3.0 | 10.0 | ns |
| t _{PHL} | I _n to 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} | I _n to 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} | I _n to GS | 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} | E _I to 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} | E _I to GS | 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} | E _I to E _O | 3.0 | 8.0 | 10.5 | 3.0 | 12.0 | |

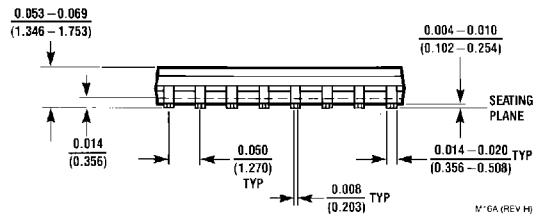
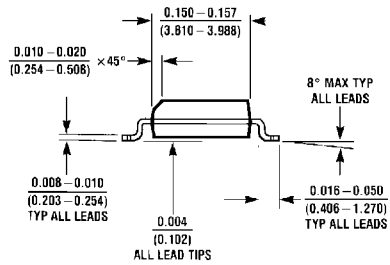
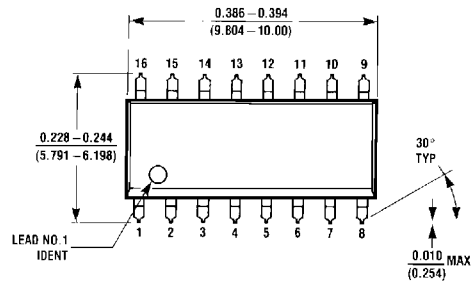
Ordering Information

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



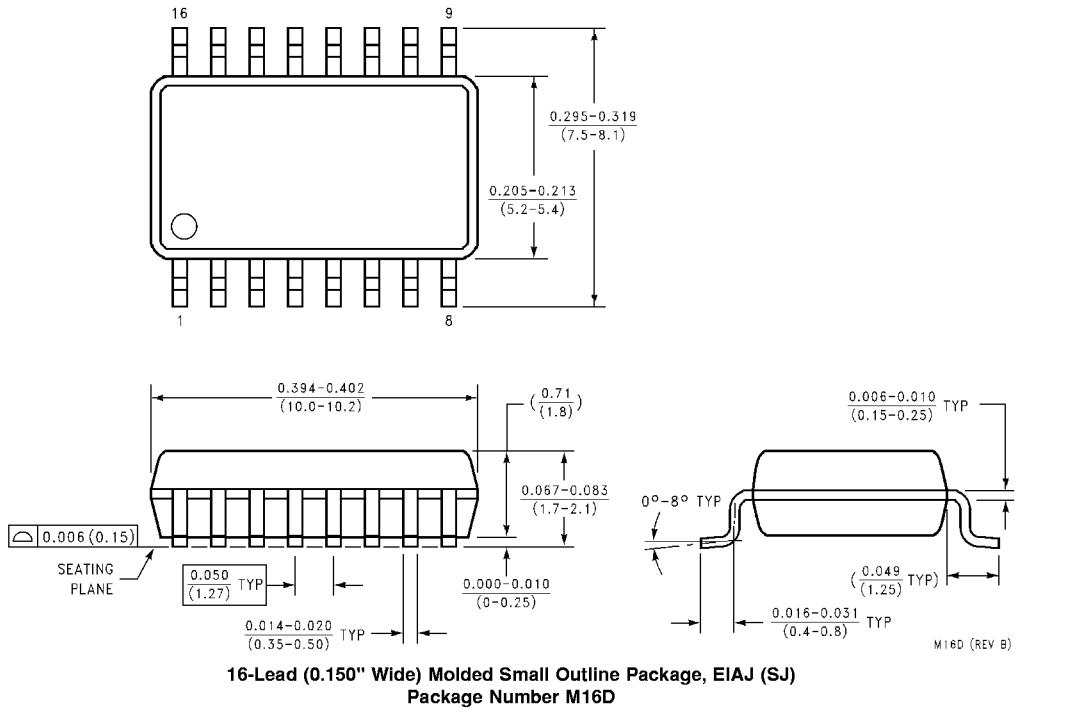
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Physical Dimensions inches (millimeters) unless otherwise noted

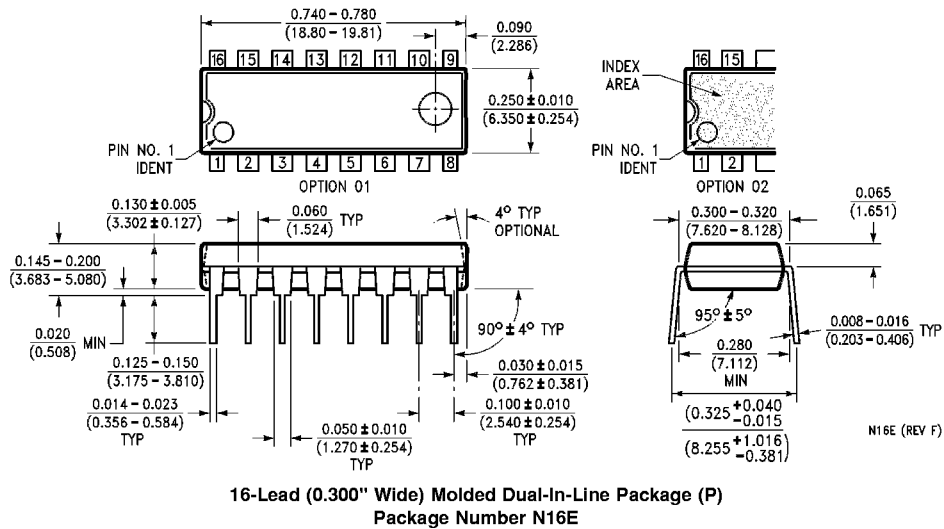


16-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
Package Number M16A

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**

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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

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