

# 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.

### Features

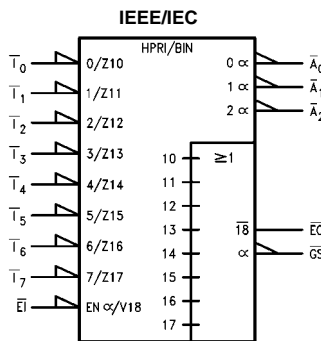
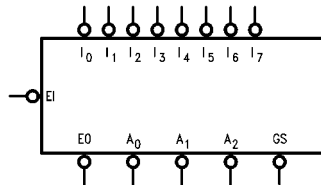
- Encodes eight data lines in priority
- Provides 3-bit binary priority code
- Input enable capability
- Signals when data is present on any input
- Cascadable for priority encoding of n bits

### Ordering Code:

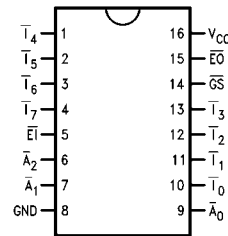
Order Number	Package Number	Package Description
74F148SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74F148SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F148PC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

### Logic Symbols



### Connection Diagram



### Truth Table

EI	Inputs								Outputs				
	I <sub>0</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	I <sub>5</sub>	I <sub>6</sub>	I <sub>7</sub>	GS	A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	EO
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	L	L	L	H
L	X	X	X	X	L	H	H	H	L	L	L	L	H
L	X	X	L	H	H	H	H	H	L	H	L	H	H
L	X	L	H	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

## Unit Loading/Fan Out

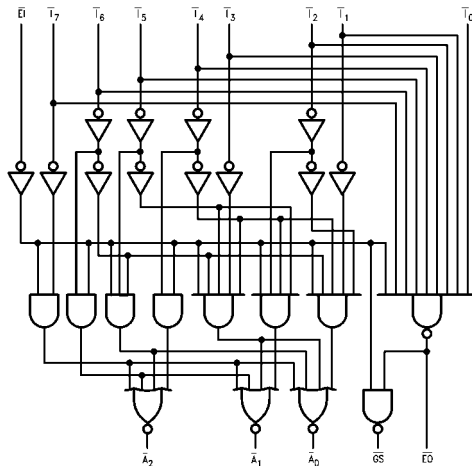
Pin Names	Description	U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$\bar{I}_0$	Priority Input (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
$\bar{I}_1$ - $\bar{I}_7$	Priority Inputs (Active LOW)	1.0/2.0	20 $\mu$ A/-1.2 mA
$\bar{EI}$	Enable Input (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
$\bar{EO}$	Enable Output (Active LOW)	50/33.3	-1 mA/20 mA
$\bar{GS}$	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 ( $\bar{EI}$ ) will force all outputs to the inactive (HIGH) state and allow new data to settle without producing erroneous information at the out-

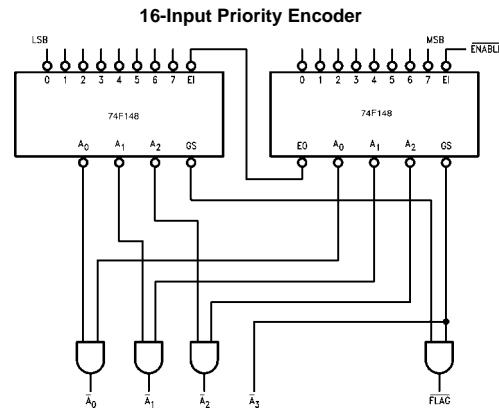
puts. A Group Signal output ( $\bar{GS}$ ) and Enable Output ( $\bar{EO}$ ) are provided along with the three priority data outputs ( $\bar{A}_2$ ,  $\bar{A}_1$ ,  $\bar{A}_0$ ).  $\bar{GS}$  is active LOW when any input is LOW: this indicates when any input is active.  $\bar{EO}$  is active LOW when 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  $\bar{EO}$  and  $\bar{GS}$  are in the inactive HIGH state when the Enable Input is HIGH.

## Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

## Application



**Absolute Maximum Ratings**(Note 1)

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 <sub>CC</sub> Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (mA)

**Recommended Operating Conditions**

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

**Note 1:** 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 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Units	V <sub>CC</sub>	Conditions
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	10% V <sub>CC</sub> 5% V <sub>CC</sub>	2.5 2.7		V	Min	I <sub>OH</sub> = -1 mA I <sub>OH</sub> = -1 mA
V <sub>OL</sub>	Output LOW Voltage	10% V <sub>CC</sub>		0.5	V	Min	I <sub>OL</sub> = 20 mA
I <sub>IH</sub>	Input HIGH Current			5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test			7.0	μA	Max	V <sub>IN</sub> = 7.0V
I <sub>CEx</sub>	Output High Leakage Current			50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	4.75			V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current			3.75	μA	0.0	V <sub>IDP</sub> = 150 mV All Other Pins Grounded
I <sub>IL</sub>	Input LOW Current			-0.6 -1.2	mA mA	Max	V <sub>IN</sub> = 0.5V (I <sub>0</sub> , E <sub>1</sub> ) V <sub>IN</sub> = 0.5V (I <sub>1</sub> -I <sub>7</sub> )
I <sub>OS</sub>	Output Short-Circuit Current	-60		-150	mA	Max	V <sub>OUT</sub> = 0V
I <sub>CC</sub> H	Power Supply Current			35	mA	Max	V <sub>O</sub> = HIGH
I <sub>CC</sub> L	Power Supply Current			35	mA	Max	V <sub>O</sub> = LOW

AC Electrical Characteristics							
Symbol	Parameter	$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$		Units
		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 $\overline{EO}$	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 $\overline{GS}$	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
$t_{PHL}$	$\overline{EI}$ 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
$t_{PHL}$	$\overline{EI}$ to $\overline{GS}$	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
$t_{PHL}$	$\overline{EI}$ to $\overline{EO}$	3.0	8.0	10.5	3.0	12.0	

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



**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow Package Number M16A**

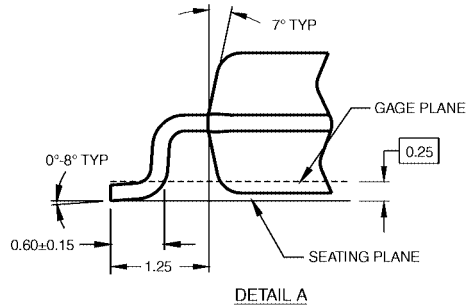
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

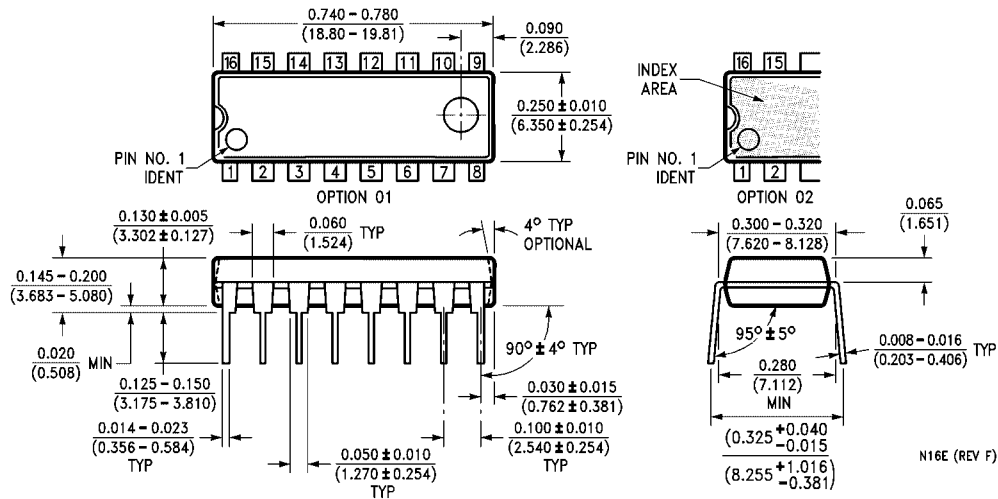
- NOTES:  
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.  
 B. DIMENSIONS ARE IN MILLIMETERS.  
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1



**16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M16D**

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



**16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N16E**

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