

Logic Products

FEATURES

- Code conversions
- Multi-channel D/A converter
- Decimal-to-BCD converter
- Cascading for priority encoding of "N" bits
- Input Enable capability
- Priority encoding — automatic selection of highest priority input line
- Output Enable — active LOW when all inputs HIGH
- Group Signal output — active when any input is LOW

DESCRIPTION

The '148 8-input priority encoder accepts data from eight active-LOW inputs 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 I_7 having the highest priority.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74148	10ns	38mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$; $T_A = 0^\circ C$ to $+70^\circ C$
Plastic DIP	N74148N
Plastic SO	

NOTES:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

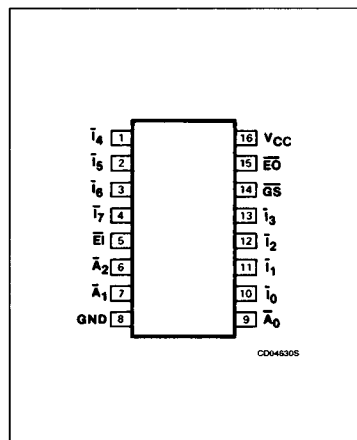
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74
$\bar{I}_0$	Input	1ul
$\bar{I}_1 - \bar{I}_7$	Inputs	2ul
$\bar{EI}$	Input	2ul
All	Outputs	10ul

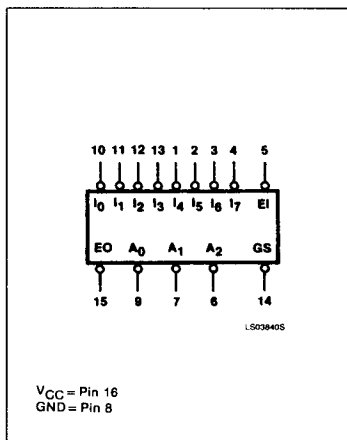
NOTE:

A 74 unit load (ul) is understood to be 40 μ A I_{IH} and -1.6mA I_{IL} .

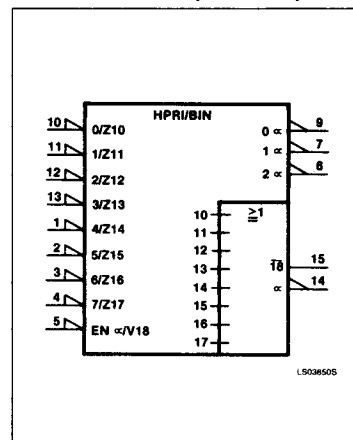
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



Encoder

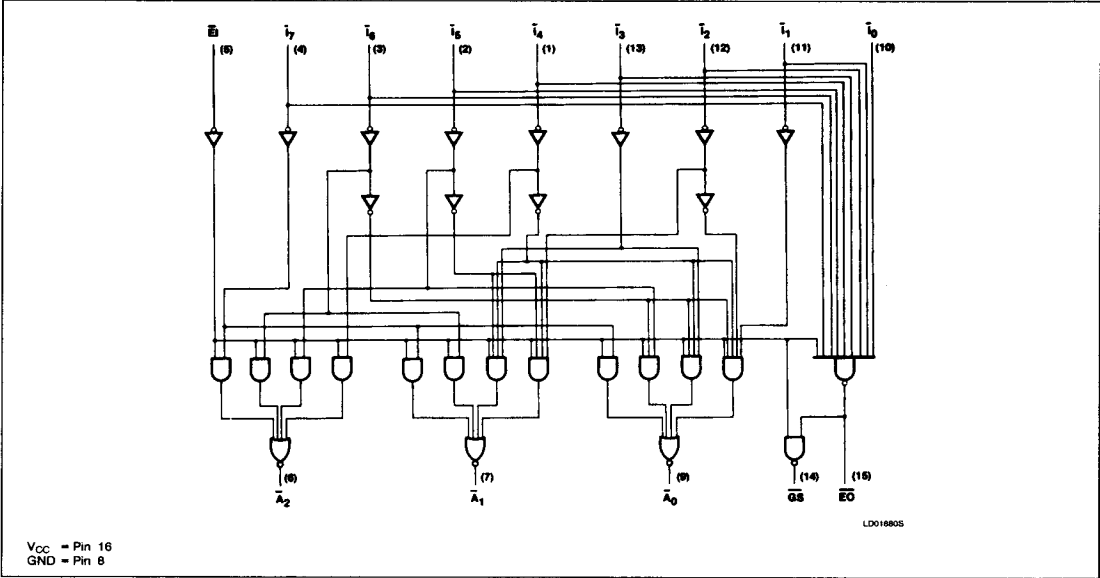
74148

A HIGH on the Enable Input ($\overline{EI}$) 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 ($\overline{GS}$) output and an Enable Output ($\overline{EO}$) are provided with the three data outputs. The $\overline{GS}$ is active-LOW when any input is LOW; this indicates when any input is active. The $\overline{EO}$ is active-LOW when all inputs

are HIGH. Using the Enable Output along with the Enable Input allows priority encoding of N input signals. Both $\overline{EO}$ and $\overline{GS}$ are active-HIGH when the Enable input is HIGH.

LOGIC DIAGRAM



FUNCTION TABLE

INPUTS									OUTPUTS				
$\overline{EI}$	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	$\overline{GS}$	$\overline{A_0}$	$\overline{A_1}$	$\overline{A_2}$	$\overline{EO}$
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	X	L	H	H	L	L	L	L	H
L	X	X	X	L	H	H	H	H	L	L	L	L	H
L	X	X	L	H	H	H	H	H	L	L	L	L	H
L	X	L	H	H	H	H	H	H	L	L	L	L	H
L	L	H	H	H	H	H	H	H	L	L	L	L	H

H = HIGH voltage level
L = LOW voltage level
X = Don't care

Encoder

74148

ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		74	UNIT
V _{CC}	Supply voltage	7.0	V
V _{IN}	Input voltage	−0.5 to +5.5	V
I _{IN}	Input current	−30 to +5	mA
V _{OUT}	Voltage applied to output in HIGH output state	−0.5 to +V _{CC}	V
T _A	Operating free-air temperature range	0 to 70	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER		74			UNIT
		Min	Nom	Max	
V _{CC}	Supply voltage	4.75	5.0	5.25	V
V _{IH}	HIGH-level input voltage	2.0			V
V _{IL}	LOW-level input voltage			+0.8	V
I _{IK}	Input clamp current			−12	mA
I _{OH}	HIGH-level output current			−800	μA
I _{OL}	LOW-level output current			16	mA
T _A	Operating free-air temperature	0		70	°C

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Encoder

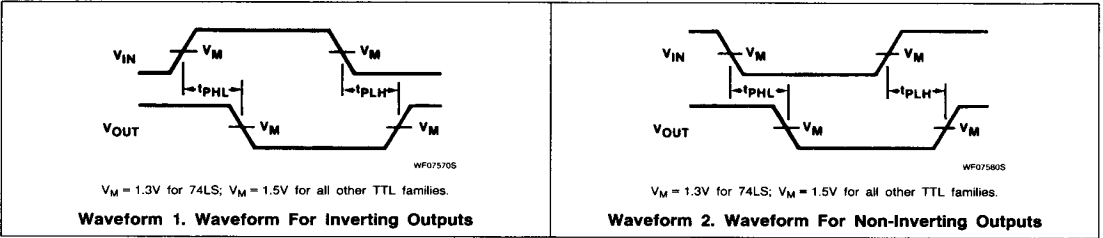
74148

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

PARAMETER	TEST CONDITIONS ¹	74148			UNIT
		Min	Typ ²	Max	
V _{OH} HIGH-level output voltage	V _{CC} = MIN, V _{IH} = MIN, V _{IL} = MAX, I _{OH} = MAX	2.4	3.3		V
V _{OL} LOW-level output voltage	V _{CC} = MIN, V _{IH} = MIN, V _{IL} = MAX, I _{OL} = MAX		0.2	0.4	V
V _{IK} Input clamp voltage	V _{CC} = MIN, I _I = I _{IK}			-1.5	V
I _I Input current at maximum input voltage	V _{CC} = MAX, V _I = 5.5V			1.0	mA
I _{IH} HIGH-level input current	V _{CC} = MAX, V _I = 2.4V	$\bar{I}_O$ input		40	μA
		Other inputs		80	μA
I _{IL} LOW-level input current	V _{CC} = MAX, V _I = 0.4V	$\bar{I}_O$ input		-1.6	mA
		Other inputs		-3.2	mA
I _{OS} Short-circuit output current ³	V _{CC} = MAX	-35		-85	mA
I _{CC} Supply current ⁴ (total)	V _{CC} = MAX	Condition 1	40	60	mA
		Condition 2	35	55	mA

- NOTES:
- 1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
 - 2. All typical values are at V_{CC} = 5V, T_A = 25°C.
 - 3. I_{OS} is tested with V_{OUT} = +0.5V and V_{CC} = V_{CC} MAX+0.5V. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.
 - 4. Condition 1: Measure I_{CC} with I₇ (from I₀) and E $\bar{I}$ grounded, other inputs and outputs open. Condition 2: Measure I_{CC} with all inputs and outputs open.

AC WAVEFORMS



Encoder

74148

AC ELECTRICAL CHARACTERISTICS $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5.0\text{V}$

PARAMETER		TEST CONDITIONS	74		UNIT
			$C_L = 15\text{pF}, R_L = 400\Omega$		
			Min	Max	
t_{PLH} t_{PHL}	Propagation delay I_n input to $\bar{A}_n$ outputs	Waveform 2, in-phase output		15 14	ns
t_{PLH} t_{PHL}	Propagation delay $\bar{I}_n$ input to $\bar{A}_n$ outputs	Waveform 1, out-of-phase output		19 19	ns
t_{PLH} t_{PHL}	Propagation delay I_n input to $\bar{E}O$ output	Waveform 1, out-of-phase output		10 25	ns
t_{PLH} t_{PHL}	Propagation delay I_n input to $\bar{G}S$ output	Waveform 2, in-phase output		30 25	ns
t_{PLH} t_{PHL}	Propagation delay $\bar{E}I$ input to $\bar{A}_n$ outputs	Waveform 2, in-phase output		15 15	ns
t_{PLH} t_{PHL}	Propagation delay $\bar{E}I$ input to $\bar{E}O$ output	Waveform 2, in-phase output		15 30	ns
t_{PLH} t_{PHL}	Propagation delay $\bar{E}I$ input to $\bar{G}S$ output	Waveform 2, in-phase output		12 15	ns

TEST CIRCUITS AND WAVEFORMS

TC02840S

WF06450S

$V_M = 1.3\text{V}$ for 74LS; $V_M = 1.5\text{V}$ for all other TTL families.

Input Pulse Definition

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

Test Circuit For 74 Totem-Pole Outputs

DEFINITIONS

R_L = Load resistor to V_{CC} ; 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.

D = Diodes are 1N916, 1N3064, or equivalent.

t_{TLH} , t_{THL} Values should be less than or equal to the table entries.