



# U74HC148

CMOS IC

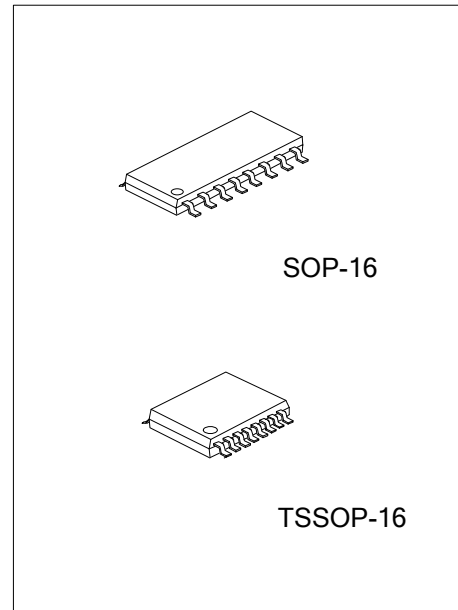
## 8-LINE TO 3-LINE PRIORITY ENCODERS

### DESCRIPTION

The UTC **U74HC148** devices encode eight data lines to 3-line binary (octal). It feature priority decoding of the inputs to ensure that only the highest-order data line is encoded. (enable input EI and enable output EO) have been provided to allow octal expansion without the need for external circuitry. Data inputs and outputs are active at the low logic level.

### FEATURES

- \* Wide supply voltage range from 2.0V to 6.0V
- \* Low static power consumption;  $I_{CC}=8\mu A$  (Max.)
- \* Encode Eight Data Lines to 3-Line Binary (Octal)
- \* High Noise Immunity



### ORDERING INFORMATION

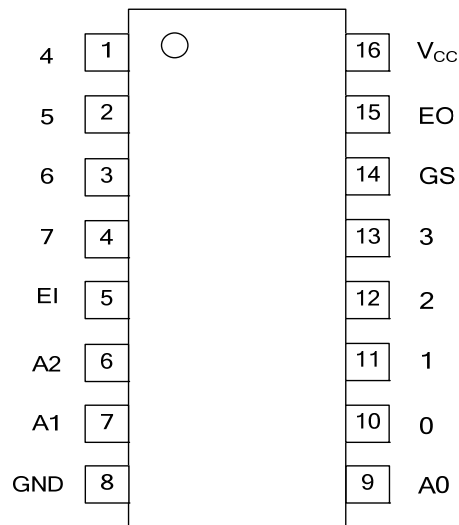
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC148L-S16-R	U74HC148G-S16-R	SOP-16	Tape Reel
U74HC148L-P16-R	U74HC148G-P16-R	TSSOP-16	Tape Reel

<p>U74HC148G-D16-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) D16: DIP-16, P16: TSSOP-16 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING

DIP-16	TSSOP-16

### ■ PIN CONFIGURATION

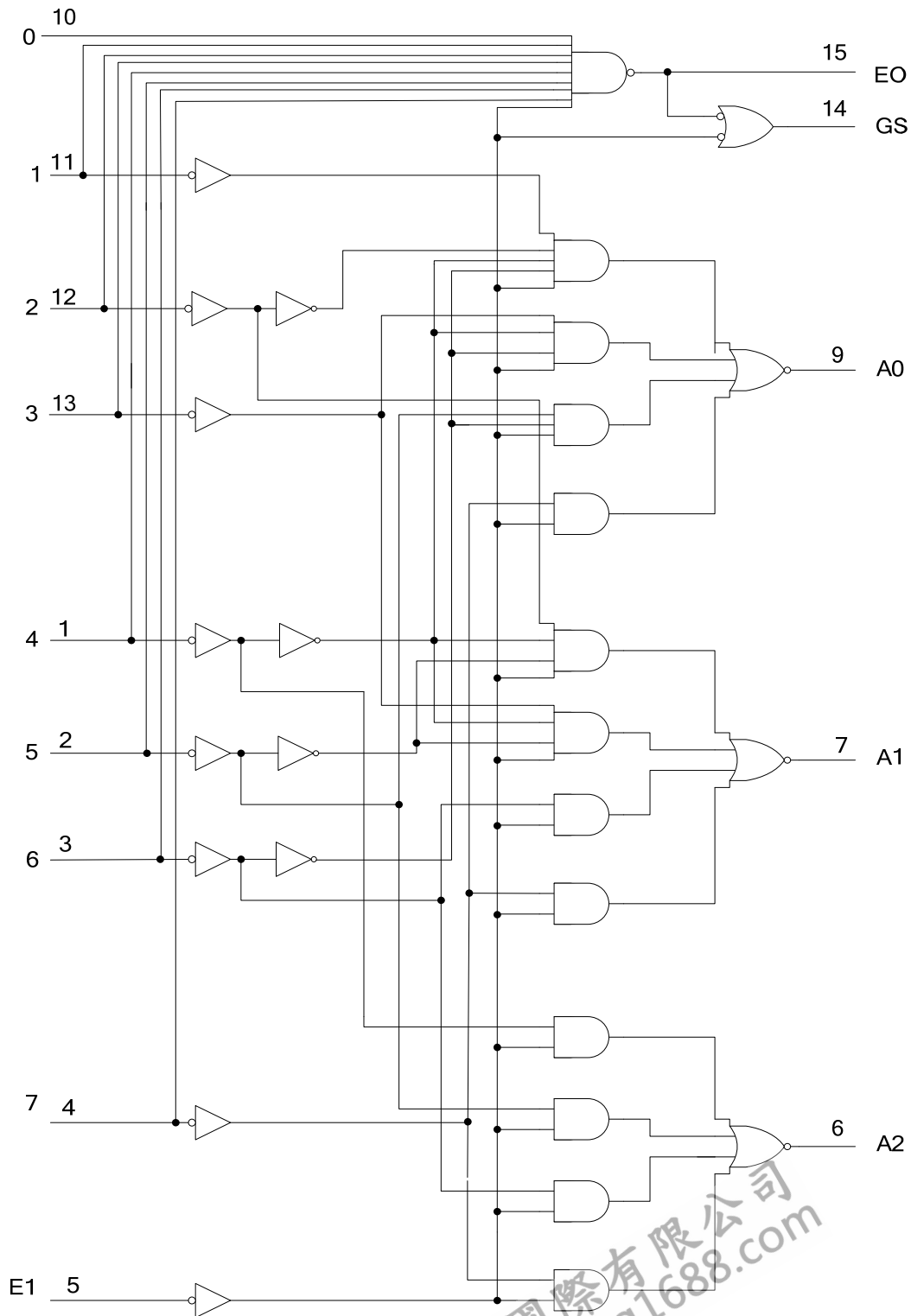


### ■ FUNCTION TABLE

EI	INPUTS								OUTPUTS				
	0	1	2	3	4	5	6	7	A2	A1	A0	GS	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	H	L	H
L	X	X	X	X	X	L	H	H	L	H	L	L	H
L	X	X	X	X	L	H	H	H	L	H	H	L	H
L	X	X	L	H	H	H	H	H	H	L	L	L	H
L	X	L	H	H	H	H	H	H	H	H	L	L	H
L	L	H	H	H	H	H	H	H	H	H	H	L	H

Note: H: High voltage level; L: Low voltage level; X: Don't care

■ LOGIC DIAGRAM (positive logic)



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	$V_{CC}$		-0.5 ~ +7.0	V
Input Voltage	$V_{IN}$		-0.5 ~ $V_{CC}+0.5$	V
Output Voltage	$V_{OUT}$	Active Mode	-0.5 ~ $V_{CC}+0.5$	V
Continuous $V_{CC}$ or GND Current	$I_{CC}$		±50	mA
Continuous Output Current	$I_{OUT}$	$V_{OUT}=0V \sim V_{CC}$	±25	mA
Input Clamp Current (Note 2)	$I_{IK}$	$V_{IN}<0V$ or $V_{IN}>V_{CC}$	±20	mA
Output Clamp Current (Note 2)	$I_{OK}$	$V_{OUT}>V_{CC}$ or $V_{OUT}<0V$	±20	mA
Storage Temperature Range	$T_{STG}$		-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		2.0	5.0	6.0	V
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
Operating Temperature	$T_A$		-40		85	°C
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=2.0V$			1000	ns
		$V_{CC}=4.5V$			500	ns
		$V_{CC}=6.0V$			400	ns

### ■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
High-level Input Voltage	$V_{IH}$	$V_{CC}=2.0V$	1.5			V		
		$V_{CC}=4.5V$	3.15			V		
		$V_{CC}=6.0V$	4.2			V		
Low-level Input Voltage	$V_{IL}$	$V_{CC}=2.0V$			0.5	V		
		$V_{CC}=4.5V$			1.35	V		
		$V_{CC}=6.0V$			1.8	V		
High-Level Output Voltage	$V_{OH}$	$V_{CC}=2.0V$	1.9	1.998		V		
		$V_{CC}=4.5V$			4.4	4.498	V	
		$V_{CC}=6.0V$			5.9	5.998	V	
		$V_{CC}=4.5V, V_{IN}=V_{IH}$ or $V_{IL}, I_{OH}=-4mA$	3.98			V		
		$V_{CC}=6.0V, V_{IN}=V_{IH}$ or $V_{IL}, I_{OH}=-5.2mA$	5.48			V		
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=2.0V$		0.002	0.1	V		
		$V_{CC}=4.5V$				0.001	0.1	V
		$V_{CC}=6.0V$				0.001	0.1	V
		$V_{CC}=4.5V, V_{IN}=V_{IH}$ or $V_{IL}, I_{OL}=4mA$			0.26	V		
		$V_{CC}=6.0V, V_{IN}=V_{IH}$ or $V_{IL}, I_{OL}=5.2mA$			0.26	V		
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6.0V, V_{IN}=V_{CC}$ or GND			±0.1	µA		
Quiescent Supply Current	$I_{CC}$	$V_{CC}=6.0V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0A$			8	µA		
Input Capacitance	$C_I$	$V_{CC}=2.0 \sim 6.0V, V_{IN}=V_{CC}$ or GND		3	10	pF		

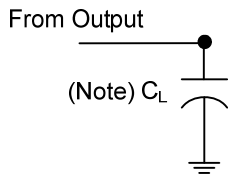
■ SWITCHING CHARACTERISTICS ( $C_L=50\text{pF}$ ,  $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (1-7) to output(A0~A2)	$t_{PD}$	$V_{CC}=2.0\text{V}$		69	180	ns
		$V_{CC}=4.5\text{V}$		23	36	ns
		$V_{CC}=6.0\text{V}$		21	31	ns
Propagation delay from input (0-7) to output(E0)		$V_{CC}=2.0\text{V}$		60	150	ns
		$V_{CC}=4.5\text{V}$		20	30	ns
		$V_{CC}=6.0\text{V}$		17	26	ns
Propagation delay from input (0-7) to output(GS)		$V_{CC}=2.0\text{V}$		75	190	ns
		$V_{CC}=4.5\text{V}$		25	38	ns
		$V_{CC}=6.0\text{V}$		21	32	ns
Propagation delay from input (E1) to output(A0~A2)		$V_{CC}=2.0\text{V}$		78	195	ns
		$V_{CC}=4.5\text{V}$		26	39	ns
		$V_{CC}=6.0\text{V}$		22	33	ns
Propagation delay from input (E1) to output(GS)	$V_{CC}=2.0\text{V}$		57	145	ns	
	$V_{CC}=4.5\text{V}$		19	29	ns	
	$V_{CC}=6.0\text{V}$		16	25	ns	
Propagation delay from input (E1) to output(E0)	$V_{CC}=2.0\text{V}$		66	166	ns	
	$V_{CC}=4.5\text{V}$		22	33	ns	
	$V_{CC}=6.0\text{V}$		19	28	ns	
Propagation delay to output(Any)	$t_t$	$V_{CC}=2.0\text{V}$		28	75	ns
		$V_{CC}=4.5\text{V}$		8	15	ns
		$V_{CC}=6.0\text{V}$		6	13	ns

■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	No load.		35		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

Note:  $C_L$  includes probe and jig capacitance.  $C_L=50\text{pF}$

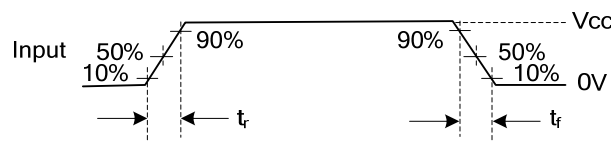


Fig. 1 Input Rise and Fall Times

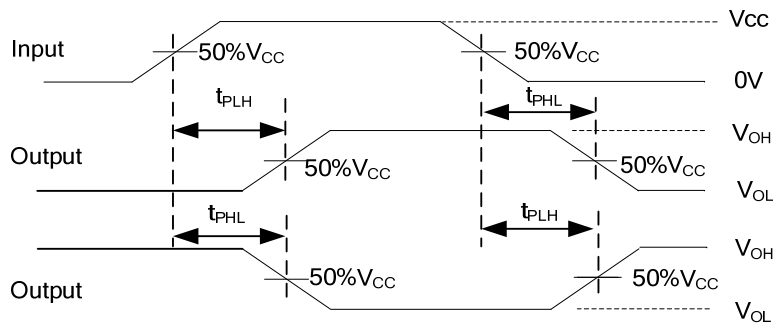


Fig. 2 Load circuitry for switching times.

- Notes: 1.  $C_L$  includes probe and jig capacitance.
- 2. All input pulses are supplied by generators having the following characteristics:  $\text{PRR} \leq 10\text{MHz}$ ,  $Z_o = 50\Omega$ .

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