HD74LS148

8-line-to-3-line Octal Priority Encoder

REJ03D0437–0200
Rev.2.00
Feb.18.2005

The HD74LS148 encodes eight data lines to three-line (4-2-1) binary (octal). Cascading circuitry (enable input EI and enable output EO) has been provided to allow octal expansion without the need for external circuitry. The data inputs and outputs are active at the low logic level.

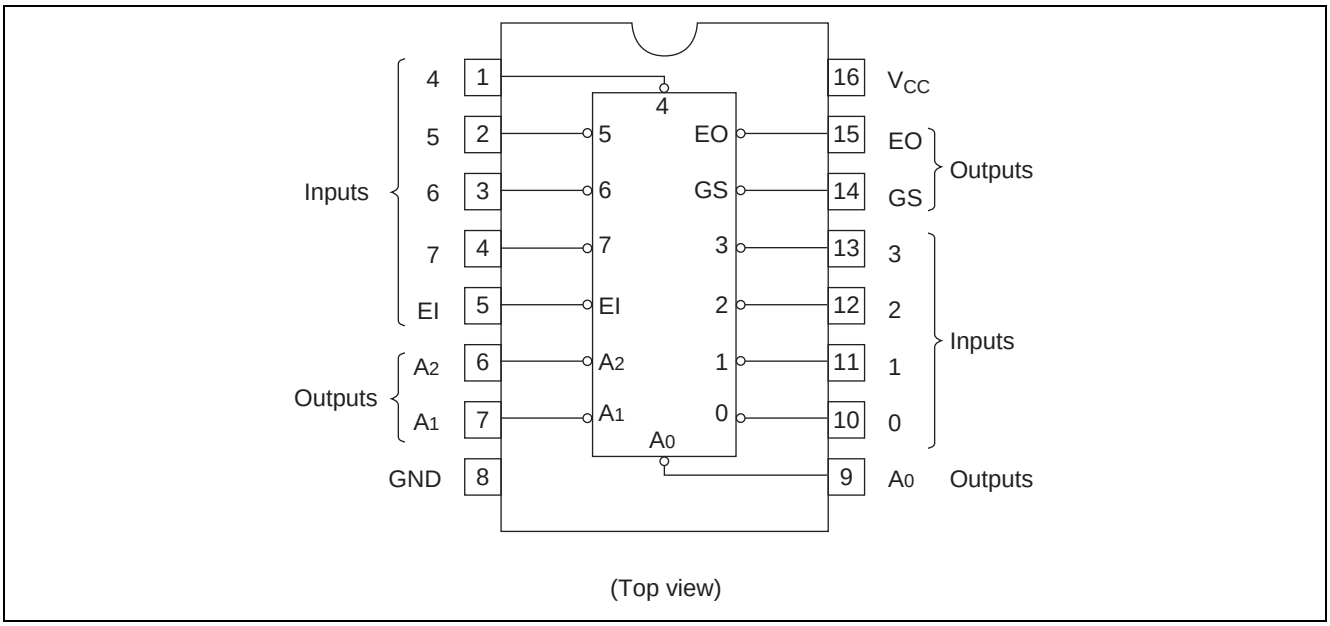
Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS148P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74LS148FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)

Note: Please consult the sales office for the above package availability.

Pin Arrangement



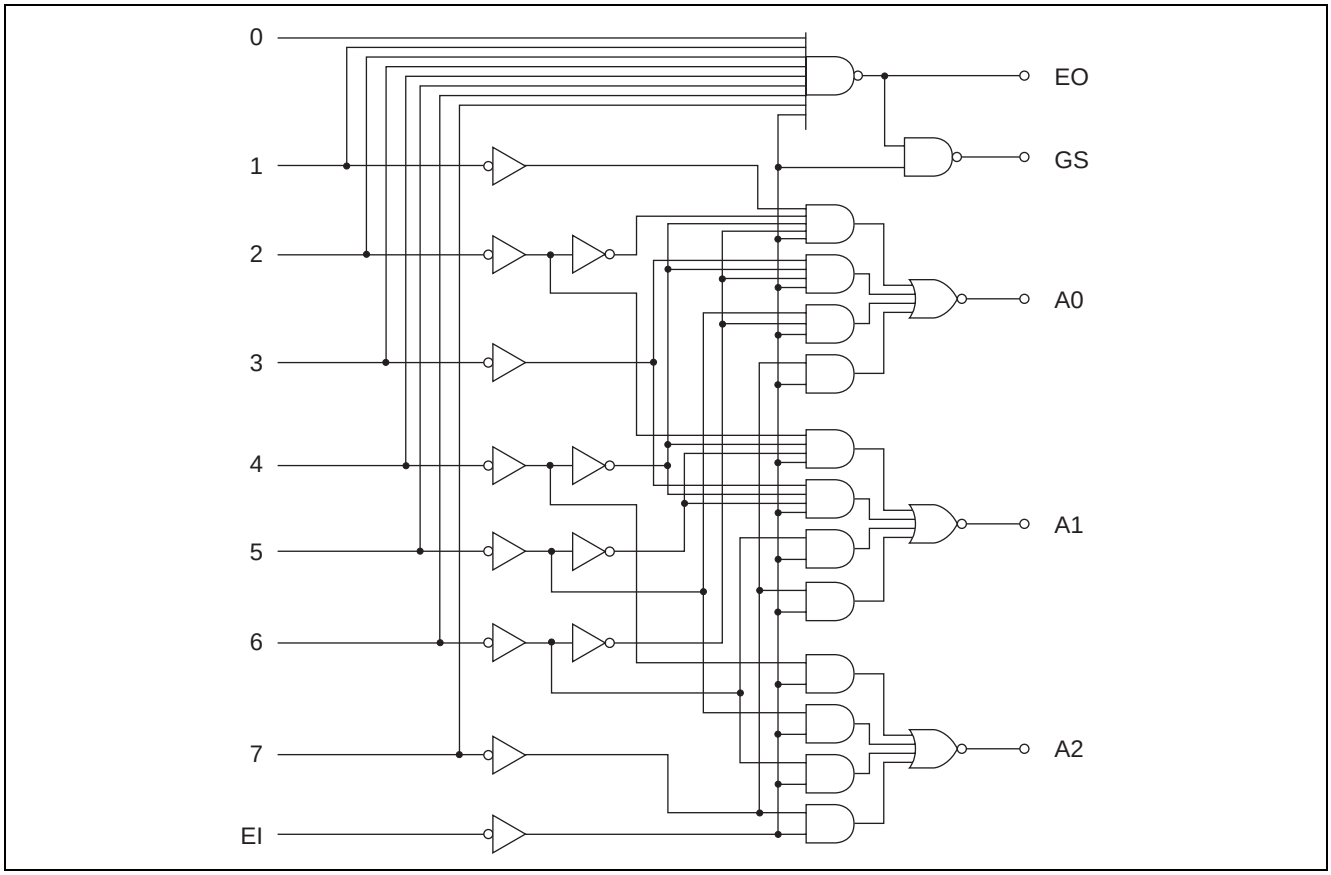
(Top view)

Function Table

Inputs									Outputs				
EI	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	X	L	H	H	H	H	H	L	L	L	H
L	X	X	L	H	H	H	H	H	H	L	H	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

H ; high level, L ; low level, X ; irrelevant

Block Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	V_{IN}	7	V
Power dissipation	P_T	400	mW
Storage temperature	Tstg	–65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.25	V
Output current	I_{OH}	—	—	–400	µA
	I_{OL}	—	—	8	mA
Operating temperature	Topr	–20	25	75	°C

Electrical Characteristics

(Ta = –20 to +75 °C)

Item		Symbol	min.	typ.*	max.	Unit	Condition
Input voltage		V_{IH}	2.0	—	—	V	
		V_{IL}	—	—	0.8	V	
Output voltage		V_{OH}	2.7	—	—	V	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = –400 µA
		V_{OL}	—	—	0.4	V	I_{OL} = 4 mA; V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V
			—	—	0.5		I_{OL} = 8 mA
Input current	1 to 7 Inputs	I_{IH}	—	—	40	µA	V_{CC} = 5.25 V, V_I = 2.7 V
	Other inputs		—	—	20		
	1 to 7 Inputs	I_{IL}	—	—	–0.8	mA	V_{CC} = 5.25 V, V_I = 0.4 V
	Other inputs		—	—	–0.4		
	1 to 7 Inputs	I_I	—	—	0.2	mA	V_{CC} = 5.25 V, V_I = 7 V
	Other inputs		—	—	0.1		
Short-circuit output current		I_{OS}	–20	—	–100	mA	V_{CC} = 5.25 V
Supply current**		I_{CC}	—	12	20	mA	Condition 1; V_{CC} = 5.25 V
			—	10	17	mA	Condition 2
Input clamp voltage		V_{IK}	—	—	–1.5	V	V_{CC} = 4.75 V, I_{IN} = –18 mA

Notes: * V_{CC} = 5 V, Ta = 25°C

** The condition 1 is measured with inputs 7 and EI grounded, other inputs and outputs open, the condition 2 is measured with all inputs and outputs open.

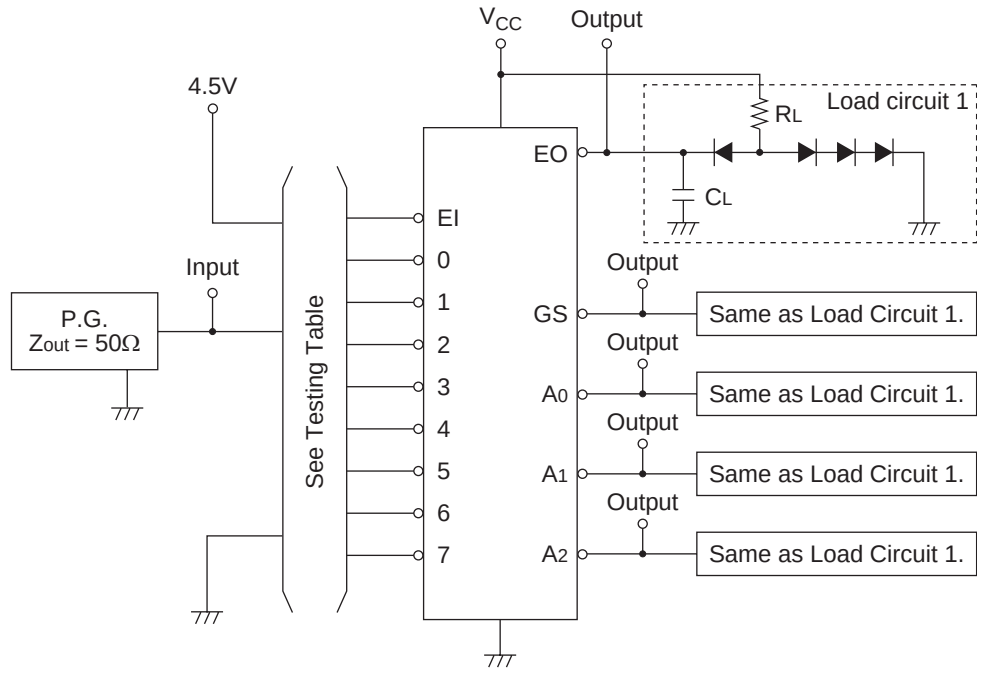
Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

Item	Symbol	min.	typ.	max.	Unit	Inputs	Outputs	Output Waveforms	Condition
Propagation delay time	t_{PLH}	—	14	18	ns	0 to 7	A_0, A_1 or A_2	In-phase Output	C_L = 15 pF, R_L = 2 kΩ
	t_{PHL}	—	15	25					
	t_{PLH}	—	20	36	ns	0 to 7	A_0, A_1 or A_2	Out-of-phase Output	
	t_{PHL}	—	16	29					
	t_{PLH}	—	7	18	ns	0 to 7	EO	Out-of-phase Output	
	t_{PHL}	—	25	40					
	t_{PLH}	—	35	55	ns	0 to 7	GS	In-phase Output	
	t_{PHL}	—	9	21					
	t_{PLH}	—	16	25	ns	EI	A_0, A_1 or A_2	In-phase Output	
	t_{PHL}	—	12	25					
	t_{PLH}	—	12	17	ns	EI	GS	In-phase Output	
	t_{PHL}	—	14	36					
	t_{PLH}	—	12	21	ns	EI	EO	In-phase Output	
	t_{PHL}	—	23	35					

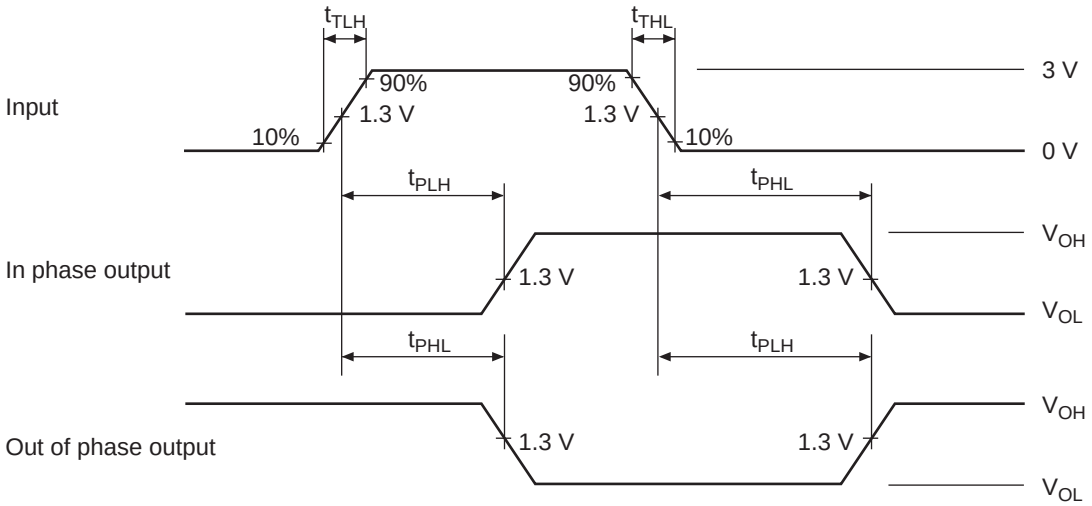
Testing Method

Test Circuit



Notes: 1. C_L includes probe and jig capacitance.
2. All diodes are 1S2074(H).

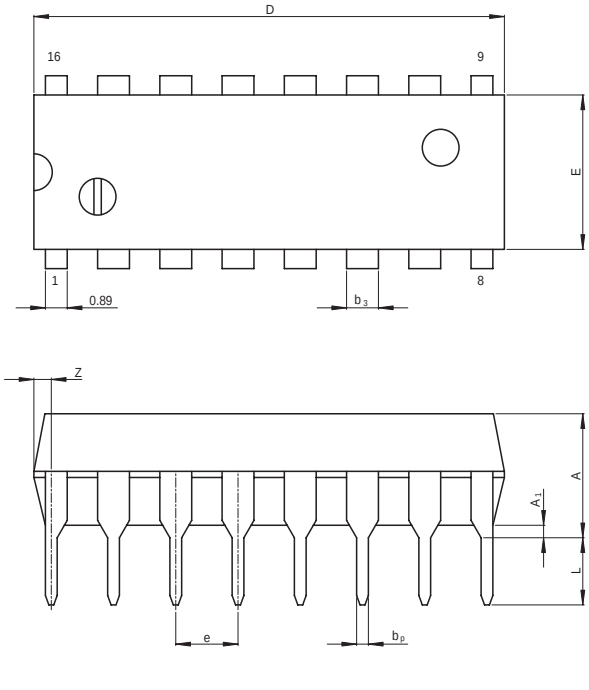
Waveform



Note: Input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle 50%

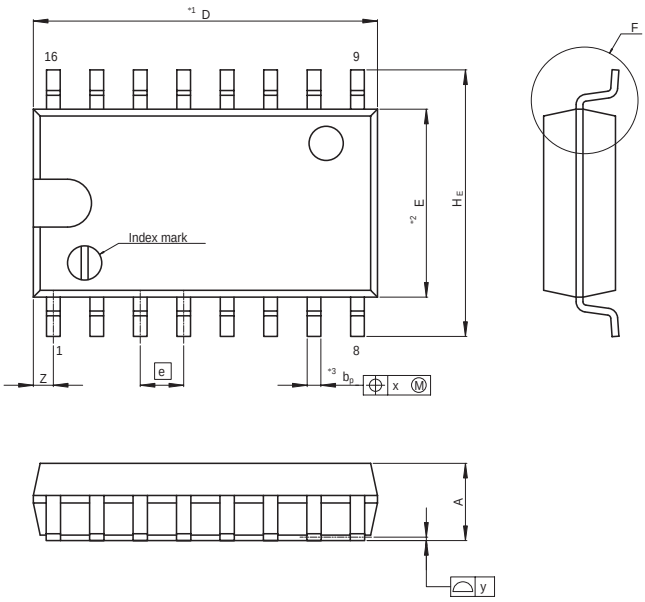
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP16-6.3x19.2-2.54	PRDP0016AE-B	DP-16FV	1.05g

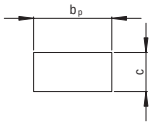


Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e 1	——	7.62	——
D	——	19.2	20.32
E	——	6.3	7.4
A	——	——	5.06
A 1	0.51	——	——
b p	0.40	0.48	0.56
b 3	——	1.30	——
c	0.19	0.25	0.31
θ	0°	——	15°
e	2.29	2.54	2.79
Z	——	——	1.12
L	2.54	——	——

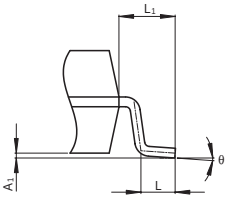
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-5.5x10.06-1.27	PRSP0016DH-B	FP-16DAV	0.24g



NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
   DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
   INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	——	10.06	10.5
E	——	5.50	——
A 2	——	——	——
A 1	0.00	0.10	0.20
A	——	——	2.20
b p	0.34	0.40	0.46
b 1	——	——	——
c	0.15	0.20	0.25
c 1	——	——	——
θ	0°	——	8°
H E	7.50	7.80	8.00
e	——	1.27	——
x	——	——	0.12
y	——	——	0.15
Z	——	——	0.80
L	0.50	0.70	0.90
L 1	——	1.15	——

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