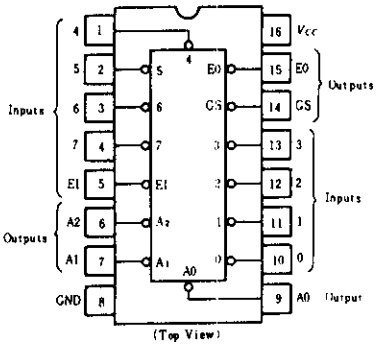
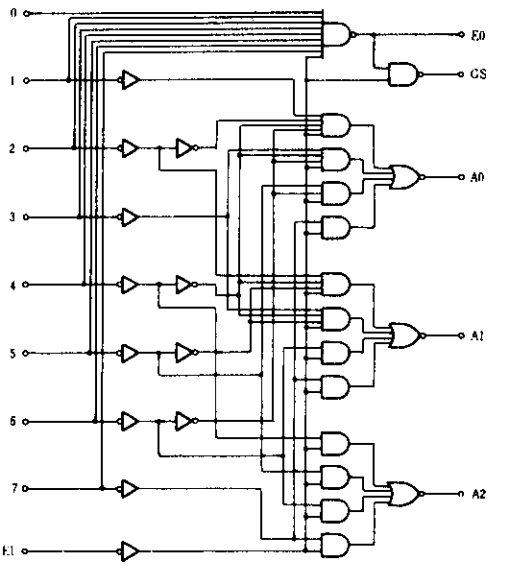
# HD74LS148 ●8-line-to-3-line Octal Priority Encoders

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.

## ■PIN ARRANGEMENT




## ■BLOCK DIAGRAM




## ■FUNCTION TABLE

| Inputs | | | | | | | | | Outputs | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EI | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | A2 | A1 | A0 | GS | EO |
| H | × | × | × | × | × | × | × | × | H | H | H | H | H |
| L | H | H | H | H | H | H | H | H | H | H | H | H | L |
| L | × | × | × | × | × | × | × | L | L | L | L | L | H |
| L | × | × | × | × | × | × | L | H | L | L | H | L | H |
| L | × | × | × | × | × | L | H | H | L | H | L | L | H |
| L | × | × | × | × | L | H | H | H | L | H | H | L | H |
| L | × | × | × | L | H | H | H | H | H | L | L | L | H |
| L | × | × | L | H | H | H | H | H | H | L | H | L | H |
| L | × | 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

## ■ELECTRICAL CHARACTERISTICS ($Ta = -20 \sim +75°C$)

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

* $V_{CC}$=5V, $Ta$=25°C

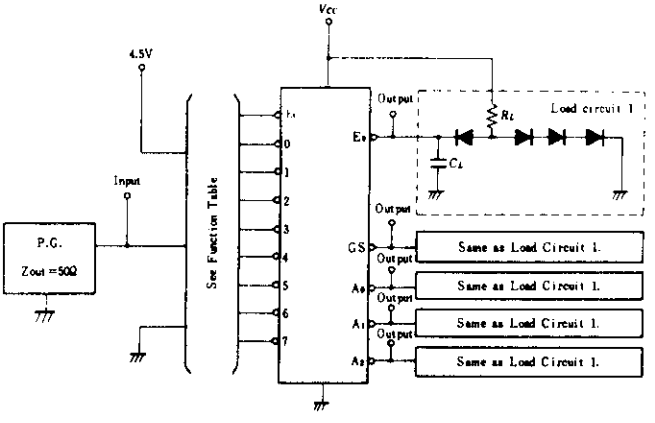
** The condition 1 is measured with inputs 7 and EI grounded, other inputs and outputs open, the condition 2 is measured with all inputs and outputs open.

## ■SWITCHING CHARACTERISTICS ( $V_{CC}$=5V, $Ta$=25℃ )

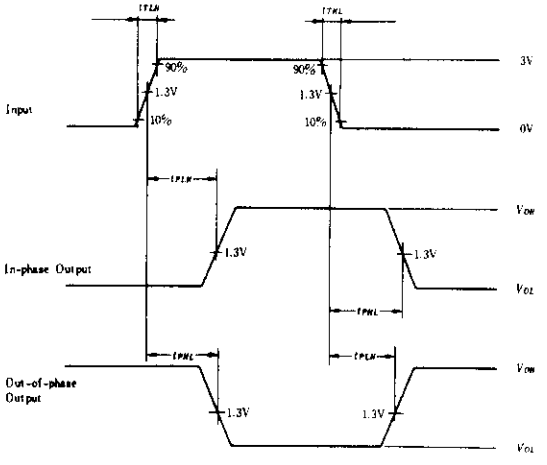
| Item | Symbol | Inputs | Outputs | Output Waveforms | Test Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$ | 0~7 | $A_0$, $A_1$ or $A_2$ | In-phase Output | $C_L$=15pF, $R_L$=2kΩ | – | 14 | 18 | ns |
| | $t_{PHL}$ | | | | | – | 15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

## ■TESTING METHOD

### 1) Test Circuit



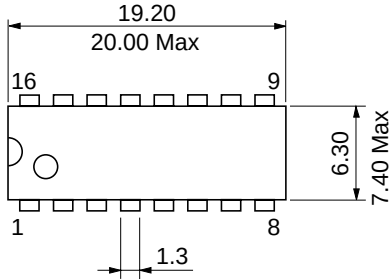

### Waveform

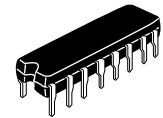


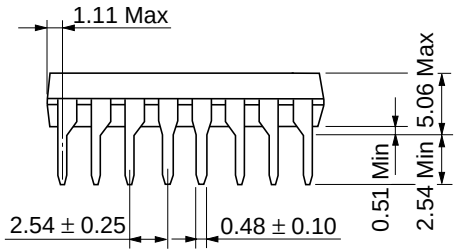

Notes) 1. $C_L$ includes probe and jig capacitance.
2. All diodes are 1S2074 Ⓗ.

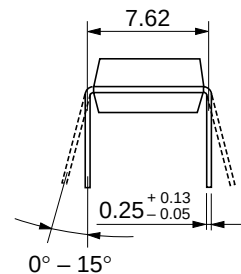
Input pulse; $t_{TLH}$≦15ns, $t_{THL}$≦6ns, $PRR$=1MHz, duty cycle 50%.

Unit: mm



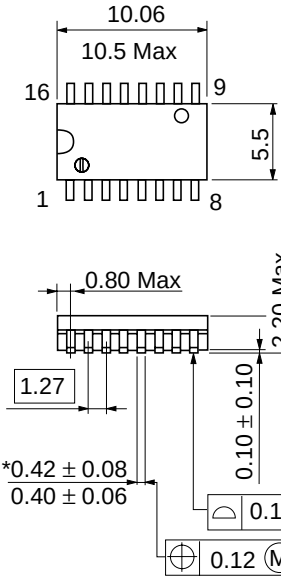



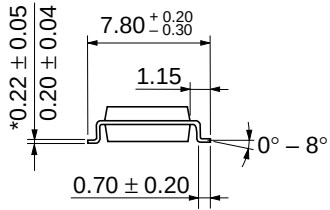


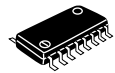




| | |
|---|---|
| Hitachi Code | DP-16 |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 1.07 g |

Unit: mm



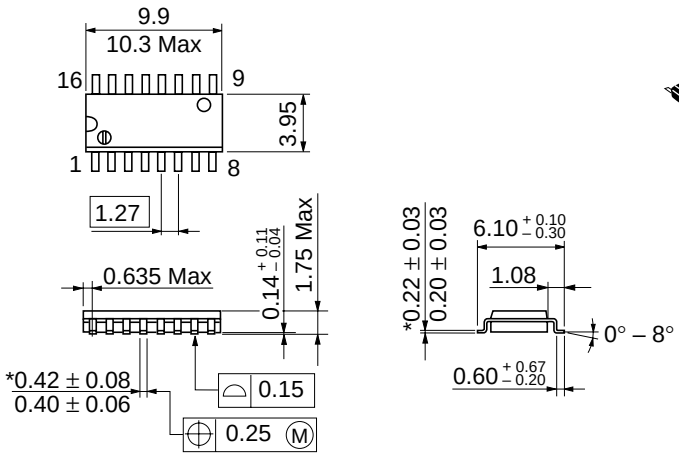



*Dimension including the plating thickness
Base material dimension

| | |
|---|---|
| Hitachi Code | FP-16DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.24 g |

Unit: mm




| | |
|---|---|
| Hitachi Code | FP-16DN |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 0.15 g |

*Dimension including the plating thickness
Base material dimension

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