

HD74HC148

8-to-3-line Octal Priority Encoder

REJ03D0573-0200
 (Previous ADE-205-447)
 Rev.2.00
 Oct 11, 2005

Description

HD74HC148 encodes eight data lines to three-line (4-2-1) binary (octal). Cascading circuitry (enable input EI and enable output EO) is provided to allow octal expansion without the need for external circuitry. The data inputs and outputs are active at the low logic level.

Features

- High Speed Operation: t_{pd} (0 - 7 to A_0 - A_2) = 15 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)
- Ordering Information

| Part Name | Package Type | Package Code (Previous Code) | Package Abbreviation | Taping Abbreviation (Quantity) |
|---------------|--------------------|------------------------------|----------------------|--------------------------------|
| HD74HC148P | DILP-16 pin | PRDP0016AE-B (DP-16FV) | P | — |
| HD74HC148FPEL | SOP-16 pin (JEITA) | PRSP0016DH-B (FP-16DAV) | FP | EL (2,000 pcs/reel) |

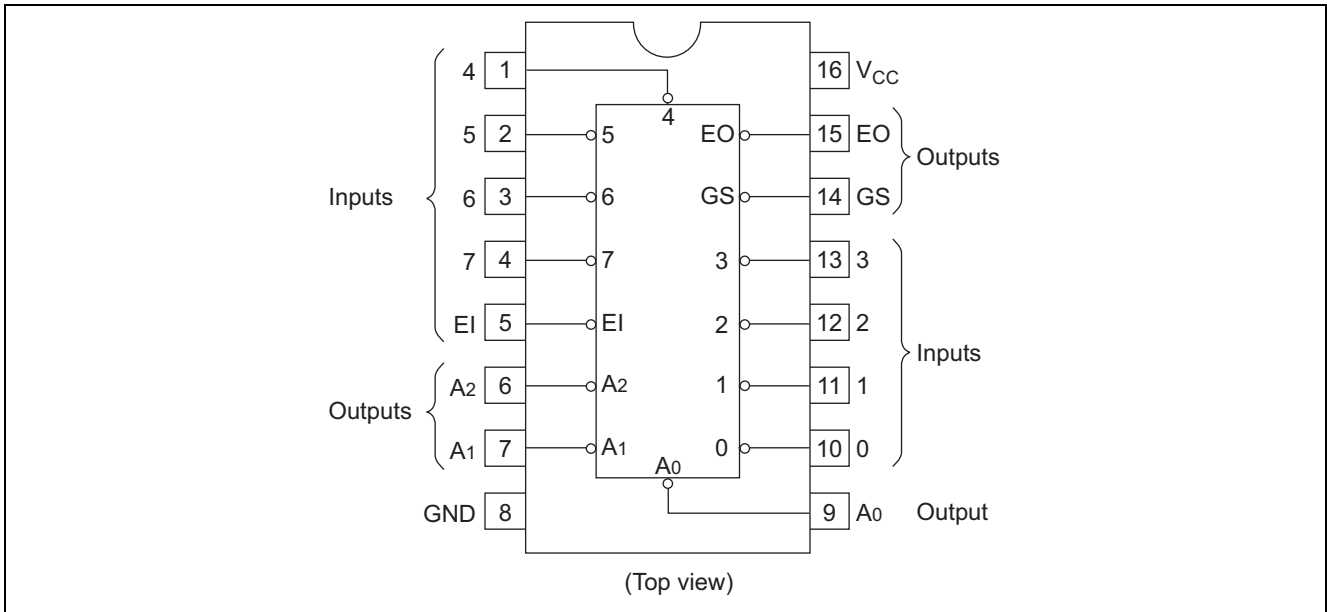
Note: Please consult the sales office for the above package availability.

Function Table

| Inputs | | | | | | | | | Outputs | | | | |
|--------|---|---|---|---|---|---|---|---|---------|-------|-------|----|----|
| EI | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | A_2 | A_1 | A_0 | 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 | 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

Pin Arrangement



Absolute Maximum Ratings

| Item | Symbol | Rating | Unit |
|-------------------------------------|----------------------|------------------------|------|
| Supply voltage range | V_{CC} | -0.5 to +7.0 | V |
| Input voltage | V_{IN} | -0.5 to $V_{CC} + 0.5$ | V |
| Output voltage | V_{OUT} | -0.5 to $V_{CC} + 0.5$ | V |
| Output current | I_{OUT} | ±25 | mA |
| DC current drain per V_{CC} , GND | I_{CC} , I_{GND} | ±50 | mA |
| DC input diode current | I_{IK} | ±20 | mA |
| DC output diode current | I_{OK} | ±20 | mA |
| Power dissipation per package | P_T | 500 | mW |
| Storage temperature | T_{stg} | -65 to +150 | °C |

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

| Item | Symbol | Ratings | Unit | Conditions |
|--------------------------------------|----------------------|---------------|------|-------------------------|
| Supply voltage | V_{CC} | 2 to 6 | V | |
| Input / Output voltage | V_{IN} , V_{OUT} | 0 to V_{CC} | V | |
| Operating temperature | T_a | -40 to 85 | °C | |
| Input rise / fall time ^{*1} | t_r , t_f | 0 to 1000 | ns | $V_{CC} = 2.0\text{ V}$ |
| | | 0 to 500 | | $V_{CC} = 4.5\text{ V}$ |
| | | 0 to 400 | | $V_{CC} = 6.0\text{ V}$ |

Note: 1. This item guarantees maximum limit when one input switches.
Waveform: Refer to test circuit of switching characteristics.

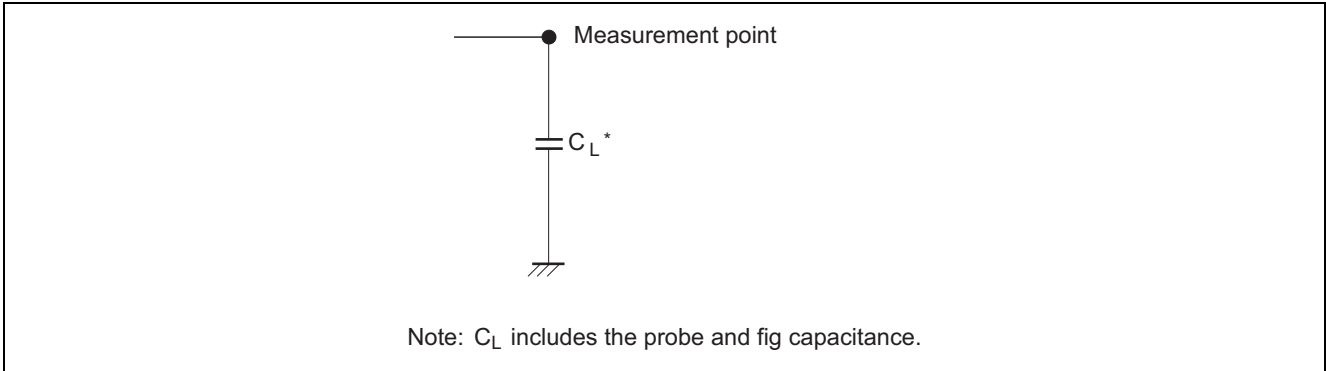
Electrical Characteristics

| Item | Symbol | V _{CC} (V) | Ta = 25°C | | | Ta = -40 to +85°C | | Unit | Test Conditions | | | | |
|--------------------------|-----------------|---------------------|-----------|------|------|-------------------|--------------------------|------|---|---------------------------|--|-------------------------|--|
| | | | Min | Typ | Max | Min | Max | | | | | | |
| Input voltage | V _{IH} | 2.0 | 1.5 | — | — | 1.5 | — | V | | | | | |
| | | 4.5 | 3.15 | — | — | 3.15 | — | | | | | | |
| | | 6.0 | 4.2 | — | — | 4.2 | — | | | | | | |
| | V _{IL} | 2.0 | — | — | 0.5 | — | 0.5 | | | | V | | |
| | | 4.5 | — | — | 1.35 | — | 1.35 | | | | | | |
| | | 6.0 | — | — | 1.8 | — | 1.8 | | | | | | |
| Output voltage | V _{OH} | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V | Vin = V _{IH} or V _{IL} | I _{OH} = -20 μA | | | |
| | | 4.5 | 4.4 | 4.5 | — | 4.4 | — | | | I _{OH} = -4 mA | | | |
| | | 6.0 | 5.9 | 6.0 | — | 5.9 | — | | | I _{OH} = -5.2 mA | | | |
| | | 4.5 | 4.18 | — | — | 4.13 | — | | | | | | |
| | | 6.0 | 5.68 | — | — | 5.63 | — | | | | | | |
| | | 2.0 | — | 0.0 | 0.1 | — | 0.1 | | | V | Vin = V _{IH} or V _{IL} | I _{OL} = 20 μA | |
| | 4.5 | — | 0.0 | 0.1 | — | 0.1 | | | | | | | |
| | 6.0 | — | 0.0 | 0.1 | — | 0.1 | | | | | | | |
| | 4.5 | — | — | 0.26 | — | 0.33 | I _{OL} = 4 mA | | | | | | |
| | 6.0 | — | — | 0.26 | — | 0.33 | I _{OL} = 5.2 mA | | | | | | |
| | 2.0 | — | — | 0.1 | — | 0.1 | | | | | | | |
| | Input current | I _{in} | 6.0 | — | — | ±0.1 | — | | ±1.0 | μA | Vin = V _{CC} or GND | | |
| Quiescent supply current | I _{CC} | 6.0 | — | — | 4.0 | — | 40 | μA | Vin = V _{CC} or GND, I _{out} = 0 μA | | | | |

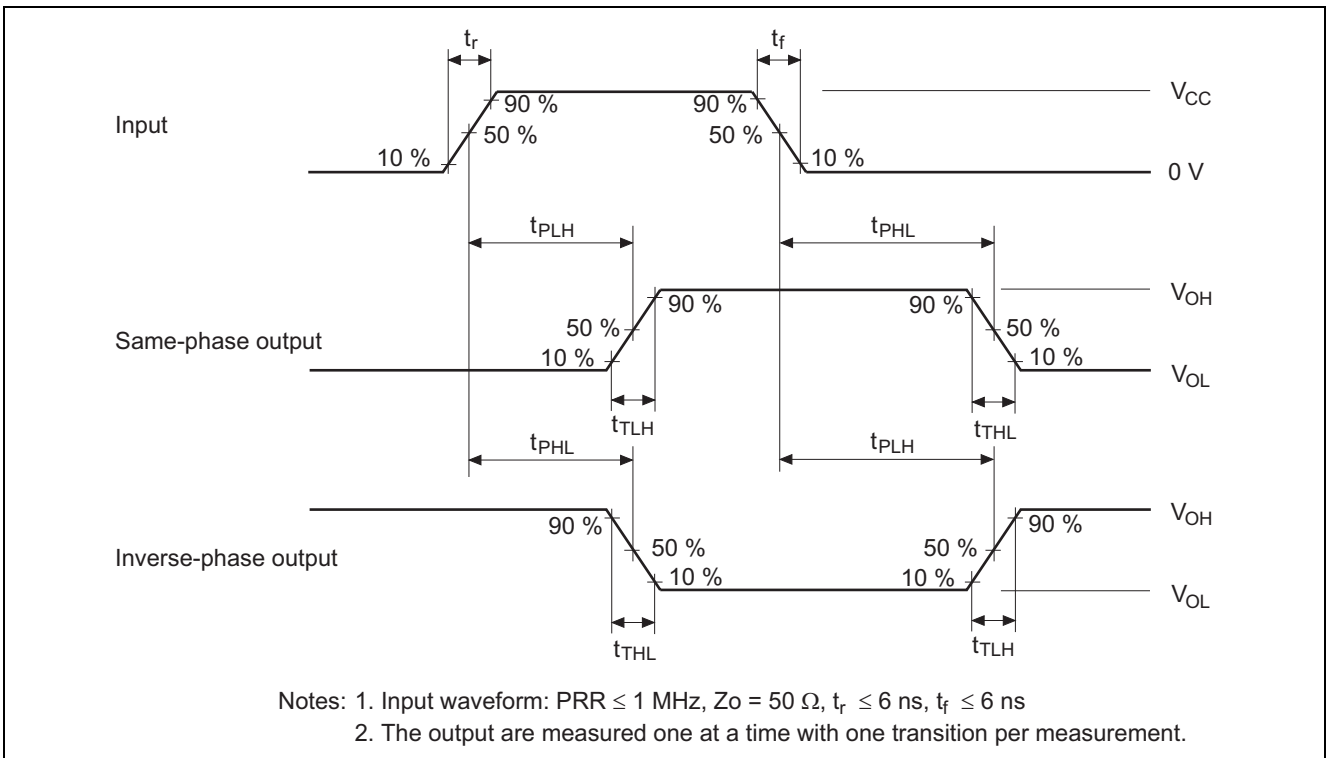
Switching Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

| Item | Symbol | V _{CC} (V) | Ta = 25°C | | | Ta = -40 to +85°C | | Unit | Test Conditions | | |
|------------------------|-------------------------------------|-------------------------------------|-----------|-----|-----|-------------------|-----|------|--|--|--|
| | | | Min | Typ | Max | Min | Max | | | | |
| Propagation delay time | t _{PLH} , t _{PHL} | 2.0 | — | — | 230 | — | 290 | ns | 0 - 7 to A ₀ - A ₂ | | |
| | | 4.5 | — | 15 | 46 | — | 58 | | | | |
| | | 6.0 | — | — | 39 | — | 49 | | | | |
| | t _{PLH} , t _{PHL} | 2.0 | — | — | 250 | — | 315 | ns | 0 - 7 to EO | | |
| | | 4.5 | — | 16 | 50 | — | 63 | | | | |
| | | 6.0 | — | — | 43 | — | 54 | | | | |
| | t _{PLH} , t _{PHL} | 2.0 | — | — | 270 | — | 340 | ns | 0 - 7 to GS | | |
| | | 4.5 | — | 18 | 54 | — | 68 | | | | |
| | | 6.0 | — | — | 46 | — | 58 | | | | |
| | t _{PLH} , t _{PHL} | 2.0 | — | — | 230 | — | 290 | ns | EI to A ₀ - A ₂ | | |
| | | 4.5 | — | 12 | 46 | — | 58 | | | | |
| | | 6.0 | — | — | 39 | — | 49 | | | | |
| | t _{PLH} , t _{PHL} | 2.0 | — | — | 250 | — | 315 | ns | EI to GS | | |
| | | 4.5 | — | 12 | 50 | — | 63 | | | | |
| | | 6.0 | — | — | 43 | — | 54 | | | | |
| | t _{PLH} , t _{PHL} | 2.0 | — | — | 270 | — | 340 | ns | EI to EO | | |
| | | 4.5 | — | 12 | 54 | — | 68 | | | | |
| | | 6.0 | — | — | 46 | — | 58 | | | | |
| | Output rise/fall time | t _{TLH} , t _{THL} | 2.0 | — | — | 75 | — | 90 | ns | | |
| | | | 4.5 | — | 5 | 15 | — | 19 | | | |
| | | | 6.0 | — | — | 13 | — | 16 | | | |
| | Input capacitance | C _{in} | — | — | 5 | 10 | — | 10 | pF | | |

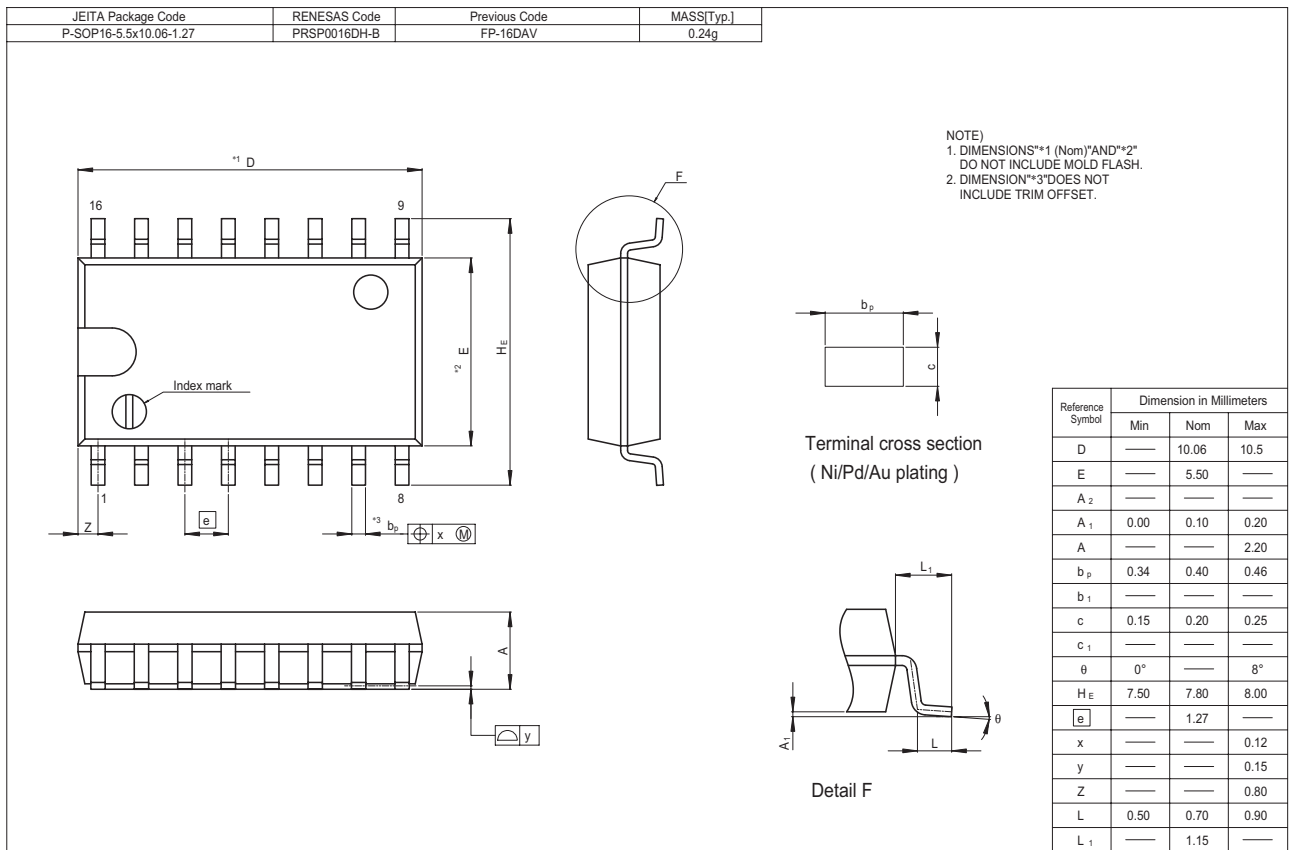
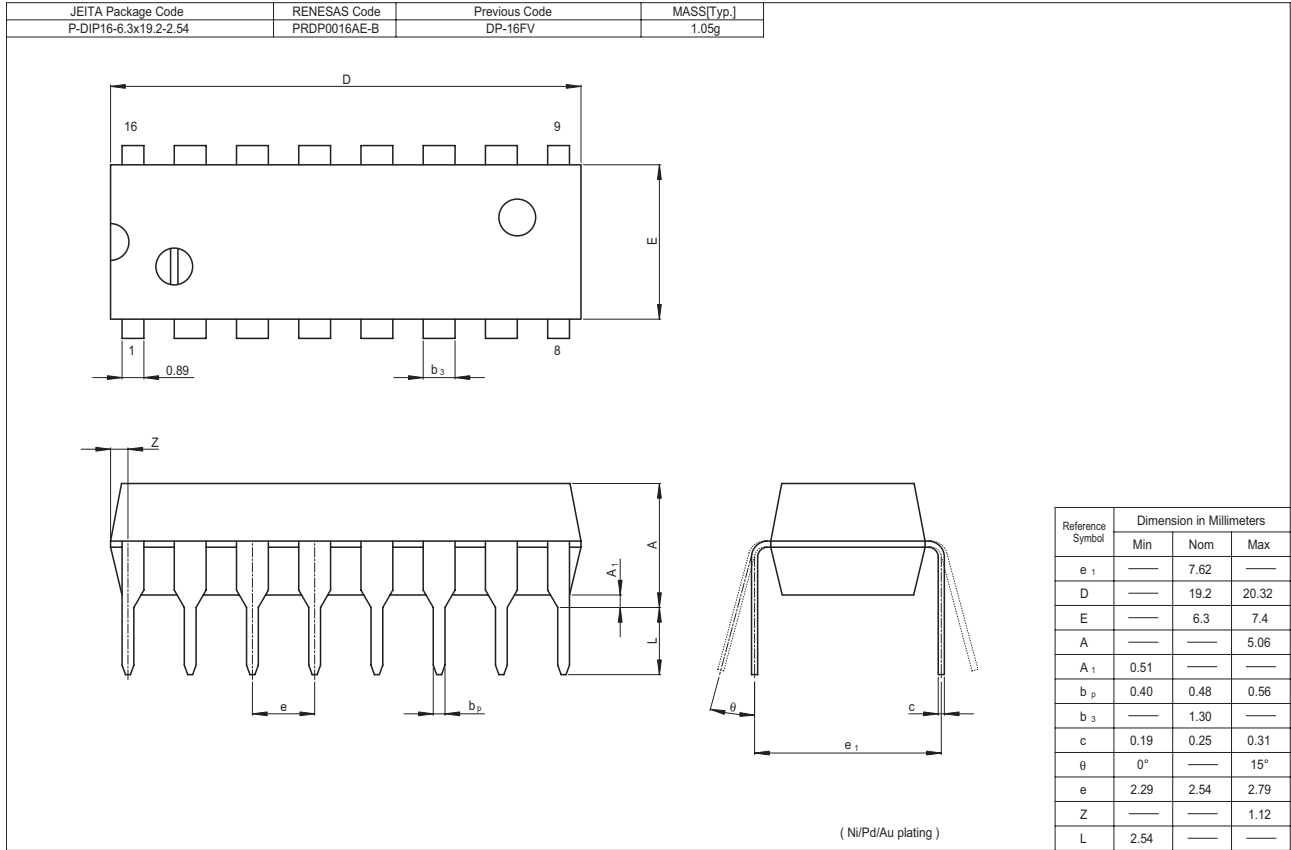
Test Circuit



Waveforms



Package Dimensions



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