

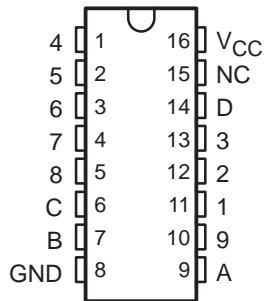
SN54147, SN54148, SN54LS147, SN54LS148 SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148 10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

SDLS053B – OCTOBER 1976 – REVISED MAY 2004

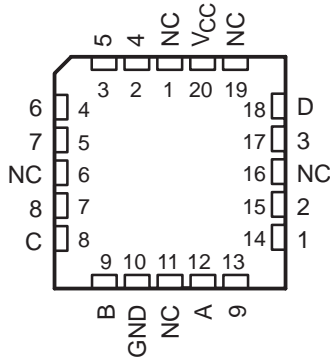
'147, 'LS147

- Encode 10-Line Decimal to 4-Line BCD
- Applications Include:
 - Keyboard Encoding
 - Range Selection

SN54147, SN54LS147 . . . J OR W PACKAGE
SN74147, SN74LS147 . . . D OR N PACKAGE
(TOP VIEW)



SN54LS147 . . . FK PACKAGE
(TOP VIEW)

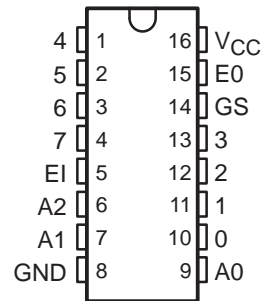


NC – No internal connection

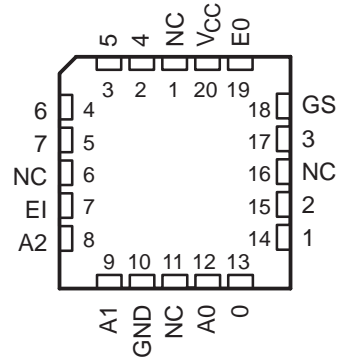
'148, 'LS148

- Encode 8 Data Lines to 3-Line Binary (Octal)
- Applications Include:
 - n-Bit Encoding
 - Code Converters and Generators

SN54148, SN54LS148 . . . J OR W PACKAGE
SN74148, SN74LS148 . . . D, N, OR NS PACKAGE
(TOP VIEW)



SN54LS148 . . . FK PACKAGE
(TOP VIEW)



| TYPE | TYPICAL DATA DELAY | TYPICAL POWER DISSIPATION |
|--------|--------------------|---------------------------|
| '147 | 10 ns | 225 mW |
| '148 | 10 ns | 190 mW |
| 'LS147 | 15 ns | 60 mW |
| 'LS148 | 15 ns | 60 mW |

NOTE: The SN54147, SN54LS147, SN54148, SN74147, SN74LS147, and SN74148 are obsolete and are no longer supplied.



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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description/ordering information

These TTL encoders feature priority decoding of the inputs to ensure that only the highest-order data line is encoded. The '147 and 'LS147 devices encode nine data lines to four-line (8-4-2-1) BCD. The implied decimal zero condition requires no input condition, as zero is encoded when all nine data lines are at a high logic level. The '148 and 'LS148 devices encode 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. For all types, data inputs and outputs are active at the low logic level. All inputs are buffered to represent one normalized Series 54/74 or 54/74LS load, respectively.

ORDERING INFORMATION

| T _A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-----------|---------------|-----------------------|------------------|
| 0°C to 70°C | PDIP – N | Tube | SN74LS148N | SN74LS148N |
| | SOIC – D | Tube | SN74LS148D | LS148 |
| | | Tape and reel | SN74LS148DR | |
| | SOP – NS | Tape and reel | SN74LS148NSR | 74LS148 |
| –55°C to 125°C | CDIP – J | Tube | SNJ54LS148J | SNJ54LS148J |
| | CFP – W | Tube | SNJ54LS148W | SNJ54LS148W |
| | LCCC – FK | Tube | SNJ54LS148FK | SNJ54LS148FK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE – '147, 'LS147

| INPUTS | | | | | | | | | OUTPUTS | | | |
|--------|---|---|---|---|---|---|---|---|---------|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | D | C | B | A |
| H | H | H | H | H | H | H | H | H | H | H | H | H |
| X | X | X | X | X | X | X | X | L | L | H | H | L |
| X | X | X | X | X | X | X | L | H | L | H | H | H |
| X | X | X | X | X | X | L | H | H | H | L | L | L |
| X | X | X | X | X | L | H | H | H | H | L | L | H |
| X | X | X | X | L | H | H | H | H | H | L | H | L |
| X | X | X | L | H | H | H | H | H | H | L | H | H |
| X | X | L | H | H | H | H | H | H | H | H | L | L |
| X | L | H | H | H | H | H | H | H | H | H | L | H |
| L | H | H | H | H | H | H | H | H | H | H | H | L |

H = high logic level, L = low logic level, X = irrelevant



SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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FUNCTION TABLE – '148, 'LS148

| 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 |

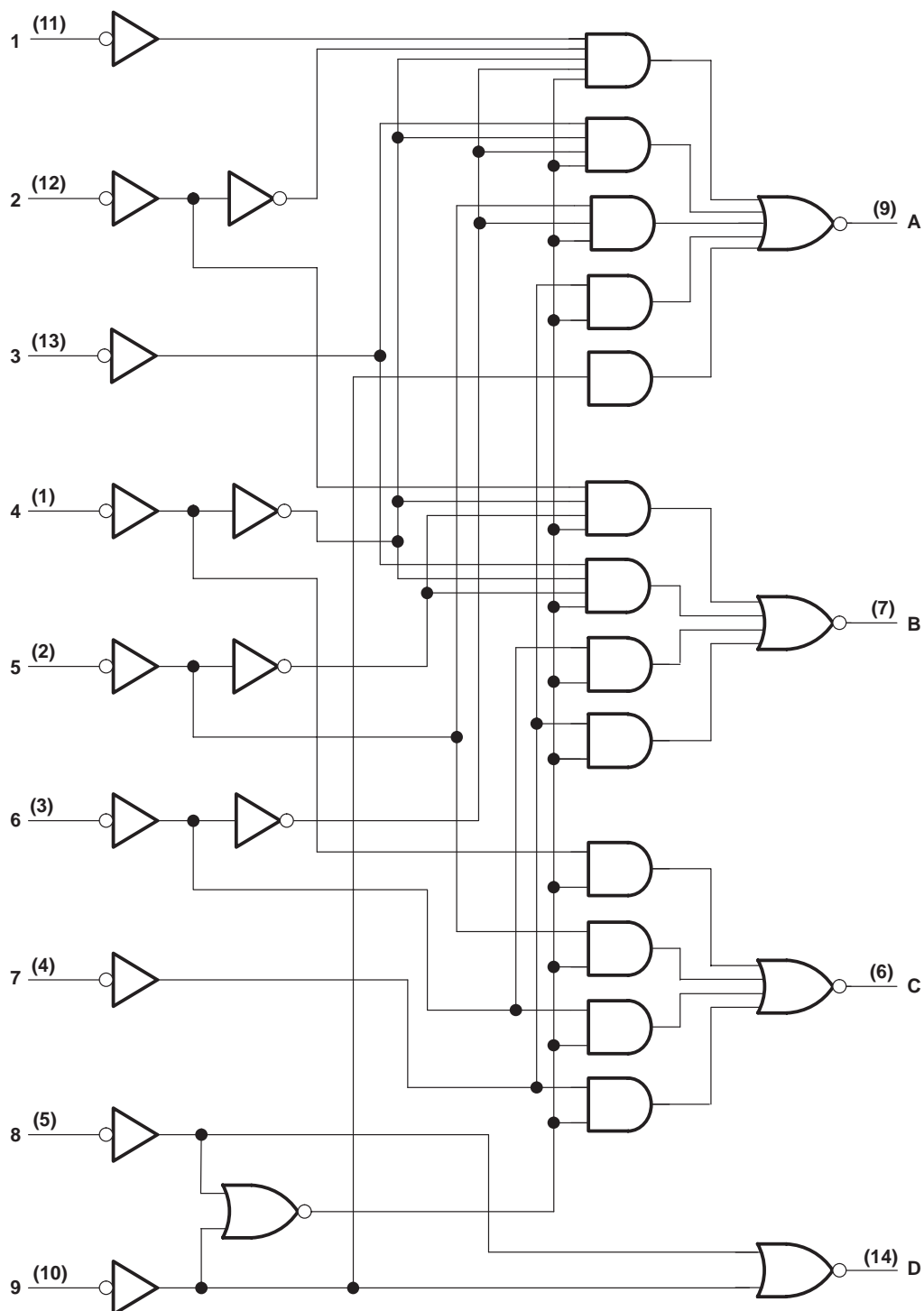
H = high logic level, L = low logic level, X = irrelevant



SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

SDLS053B – OCTOBER 1976 – REVISED MAY 2004

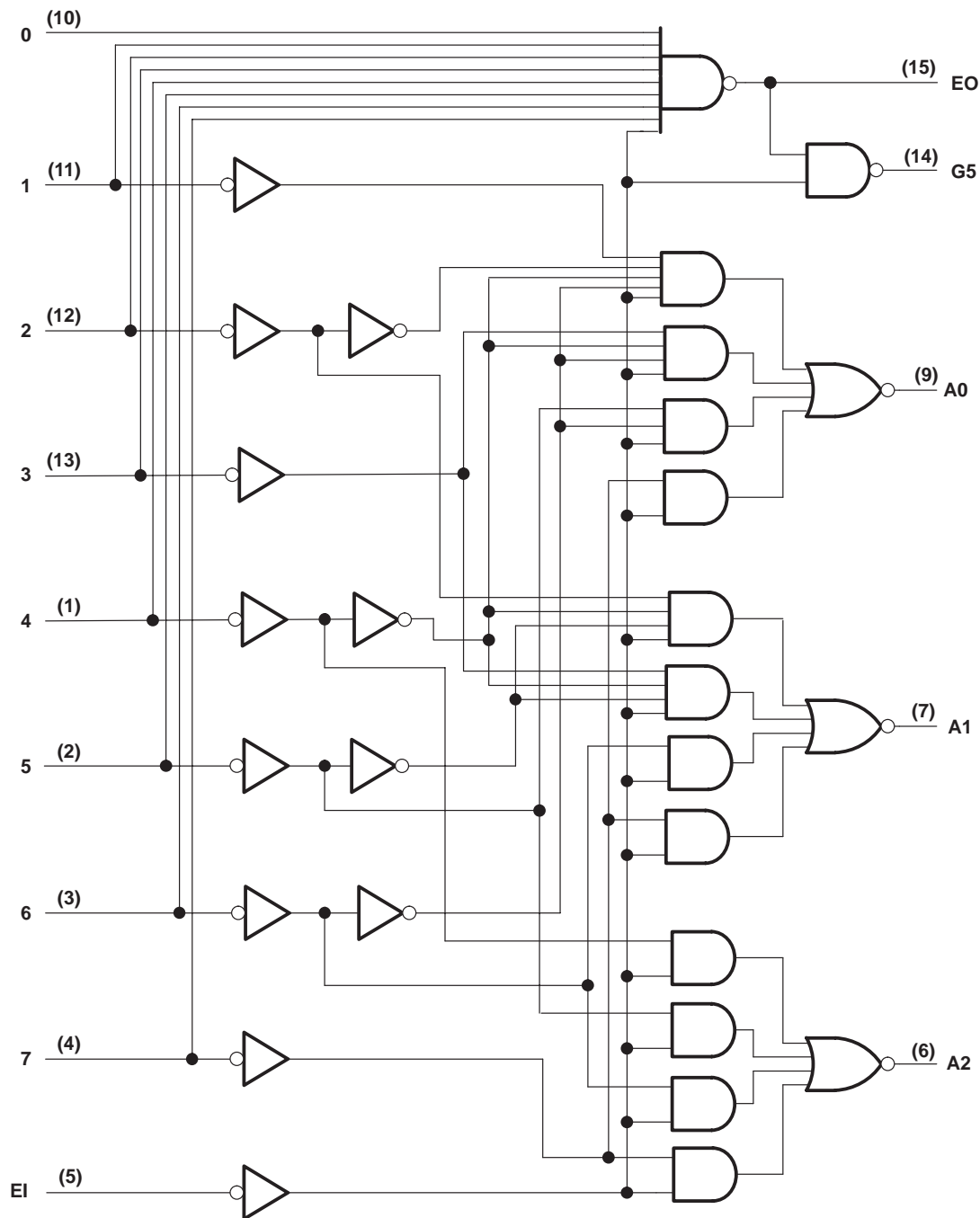
'147, 'LS147 logic diagram (positive logic)



Pin numbers shown are for D, J, N, and W packages.

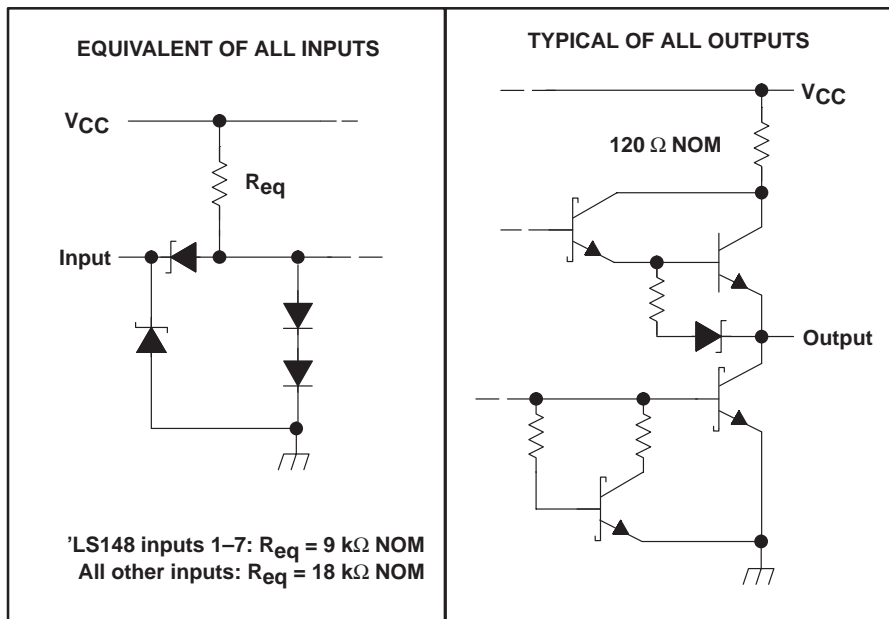
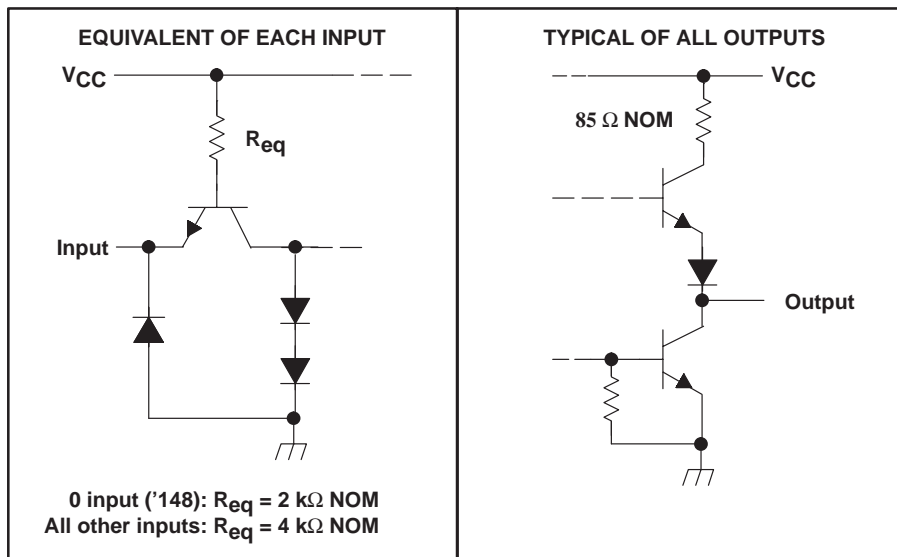
SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS
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'148, 'LS148 logic diagram (positive logic)



Pin numbers shown are for D, J, N, NS, and W packages.

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**SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS**

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absolute maximum ratings over operating free-air temperature (unless otherwise noted)[†]

| | |
|---|----------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage, V_I : '147, '148 | 5.5 V |
| 'LS147, 'LS148 | 7 V |
| Inter-emitter voltage: '148 only (see Note 2) | 5.5 V |
| Package thermal impedance θ_{JA} (see Note 3): D package | 73°C/W |
| N package | 67°C/W |
| NS package | 64°C/W |
| Storage temperature range, T_{stg} | –65°C to 150°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. Voltage values, except inter-emitter voltage, are with respect to the network ground terminal.
2. This is the voltage between two emitters of a multiple-emitter transistor. For '148 circuits, this rating applies between any two of the eight data lines, 0 through 7.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 4)

| | SN54' | | | SN74' | | | SN54LS' | | | SN74LS' | | | UNIT |
|--------------------------------------|-------|-----|------|-------|-----|------|---------|-----|------|---------|-----|------|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| I_{OH} High-level output current | | | –800 | | | –800 | | | –400 | | | –400 | μA |
| I_{OL} Low-level output current | | | 16 | | | 16 | | | 4 | | | 8 | mA |
| T_A Operating free-air temperature | –55 | | 125 | 0 | | 70 | –55 | | 125 | 0 | | 70 | °C |

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.



SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | | | TEST CONDITIONS† | | '147 | | | '148 | | | UNIT |
|-----------------|--|--------------------|--|-------------|------|------|-----|------|------|-----|------|
| | | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V _{IH} | High-level input voltage | | | | 2 | | | 2 | | | V |
| V _{IL} | Low-level input voltage | | | | 0.8 | | | 0.8 | | | V |
| V _{IK} | Input clamp voltage | | V _{CC} = MIN, I _I = –12 mA | | –1.5 | | | –1.5 | | | V |
| V _{OH} | High-level output voltage | | V _{CC} = MIN, V _{IL} = 0.8 V, V _{IH} = 2 V, I _{OH} = –800 μA | | 2.4 | 3.3 | | 2.4 | 3.3 | | V |
| V _{OL} | Low-level output voltage | | V _{CC} = MIN, V _{IL} = 0.8 V, V _{IH} = 2 V, I _{OL} = 16 mA | | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I _I | Input current at maximum input voltage | | V _{CC} = MIN, V _I = 5.5 V | | 1 | | | 1 | | | mA |
| I _{IH} | High-level input current | 0 input | V _{CC} = MAX, V _I = 2.4 V | | | | | 40 | | | μA |
| | | Any input except 0 | | | 40 | | | 80 | | | |
| I _{IL} | Low-level input current | 0 input | V _{CC} = MAX, V _I = 0.4 V | | | | | –1.6 | | | mA |
| | | Any input except 0 | | | –1.6 | | | –3.2 | | | |
| I _{OS} | Short-circuit output current§ | | V _{CC} = MAX | | –35 | | –85 | –35 | | –85 | mA |
| I _{CC} | Supply current | | V _{CC} = MAX (See Note 5) | Condition 1 | 50 | 70 | | 40 | 60 | mA | |
| | | | | Condition 2 | 42 | 62 | | 35 | 55 | | |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Not more than one output should be shorted at a time.

NOTE 5: For '147, I_{CC} (Condition 1) is measured with input 7 grounded, other inputs and outputs open; I_{CC} (Condition 2) is measured with all inputs and outputs open. For '148, I_{CC} (Condition 1) is measured with inputs 7 and EI grounded, other inputs and outputs open; I_{CC} (Condition 2) is measured with all inputs and outputs open.

SN54147, SN74147 switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | WAVEFORM | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|-----------------|----------------|---------------------|---|-----|-----|-----|------|
| t _{PLH} | Any | Any | In-phase output | C _L = 15 pF, R _L = 400 Ω | | 9 | 14 | ns |
| t _{PHL} | | | | | | 7 | 11 | |
| t _{PLH} | Any | Any | Out-of-phase output | | | 13 | 19 | ns |
| t _{PHL} | | | | | | 12 | 19 | |

SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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SN54148, SN74148 switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

| PARAMETER† | FROM (INPUT) | TO (OUTPUT) | WAVEFORM | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------|-----------------|----------------|---------------------|---|-----|-----|-----|------|
| tPLH | 1–7 | A0, A1, or A2 | In-phase output | C _L = 15 pF, R _L = 400 Ω | 10 | 15 | ns | |
| tPHL | | | | | 9 | 14 | | |
| tPLH | 1–7 | A0, A1, or A2 | Out-of-phase output | | 13 | 19 | ns | |
| tPHL | | | | | 12 | 19 | | |
| tPLH | 0–7 | EO | Out-of-phase output | | 6 | 10 | ns | |
| tPHL | | | | | 14 | 25 | | |
| tPLH | 0–7 | GS | In-phase output | | 18 | 30 | ns | |
| tPHL | | | | | 14 | 25 | | |
| tPLH | EI | A0, A1, or A2 | In-phase output | | 10 | 15 | ns | |
| tPHL | | | | | 10 | 15 | | |
| tPLH | EI | GS | In-phase output | | 8 | 12 | ns | |
| tPHL | | | | | 10 | 15 | | |
| tPLH | EI | EO | In-phase output | | 10 | 15 | ns | |
| tPHL | | | | | 17 | 30 | | |

† t_{PLH} = propagation delay time, low-to-high-level output.

t_{PHL} = propagation delay time, high-to-low-level output.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | | | TEST CONDITIONS† | | SN54LS' | | | SN74LS' | | | UNIT |
|-----------------|--|-------------------|---|------------------------|----------|------|----------|----------|------|-----|------|
| | | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V _{IH} | High-level input voltage | | | | 2 | | | 2 | | | V |
| V _{IL} | Low-level input voltage | | | | 0.7 | | | 0.8 | | | V |
| V _{IK} | Input clamp voltage | | V _{CC} = MIN, I _I = −18 mA | | −1.5 | | | −1.5 | | | V |
| V _{OH} | High-level output voltage | | V _{CC} = MIN, V _{IH} = 2 V, I _{OH} = −400 μA | | 2.5 3.4 | | | 2.7 3.4 | | | V |
| V _{OL} | Low-level output voltage | | V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = V _{IL} MAX | I _{OL} = 4 mA | 0.25 0.4 | | | 0.25 0.4 | | | V |
| | | | I _{OL} = 8 mA | | | | 0.35 0.5 | | | | |
| I _I | Input current at maximum input voltage | 'LS148 inputs 1–7 | V _{CC} = MAX, V _I = 7 V | | 0.2 | | | 0.2 | | | mA |
| | | All other inputs | | | 0.1 | | | 0.1 | | | |
| I _{IH} | High-level input current | 'LS148 inputs 1–7 | V _{CC} = MAX, V _I = 2.7 V | | 40 | | | 40 | | | μA |
| | | All other inputs | | | 20 | | | 20 | | | |
| I _{IL} | Low-level input current | 'LS148 inputs 1–7 | V _{CC} = MAX, V _I = 0.4 V | | −0.8 | | | −0.8 | | | mA |
| | | All other inputs | | | −0.4 | | | −0.4 | | | |
| I _{OS} | Short-circuit output current§ | | V _{CC} = MAX | | −20 −100 | | | −20 −100 | | | mA |
| I _{CC} | Supply current | | V _{CC} = MAX (See Note 6) | Condition 1 | 12 20 | | | 12 20 | | | mA |
| | | | | Condition 2 | 10 17 | | | 10 17 | | | |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

§ Not more than one output should be shorted at a time.

NOTE 6: For 'LS147, I_{CC} (Condition 1) is measured with input 7 grounded, other inputs and outputs open; I_{CC} (Condition 2) is measured with all inputs and outputs open. For 'LS148, I_{CC} (Condition 1) is measured with inputs 7 and EI grounded, other inputs and outputs open; I_{CC} (Condition 2) is measured with all inputs and outputs open.



SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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SN54LS147, SN74LS147 switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 2)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | WAVEFORM | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------|-----------------|----------------|---------------------|--|-----|-----|-----|------|
| t _{PLH} | Any | Any | In-phase output | C _L = 15 pF, R _L = 2 kΩ | 12 | 18 | ns | |
| t _{PHL} | | | | | 12 | 18 | | |
| t _{PLH} | Any | Any | Out-of-phase output | | 21 | 33 | ns | |
| t _{PHL} | | | | | 15 | 23 | | |

SN54LS148, SN74LS148 switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 2)

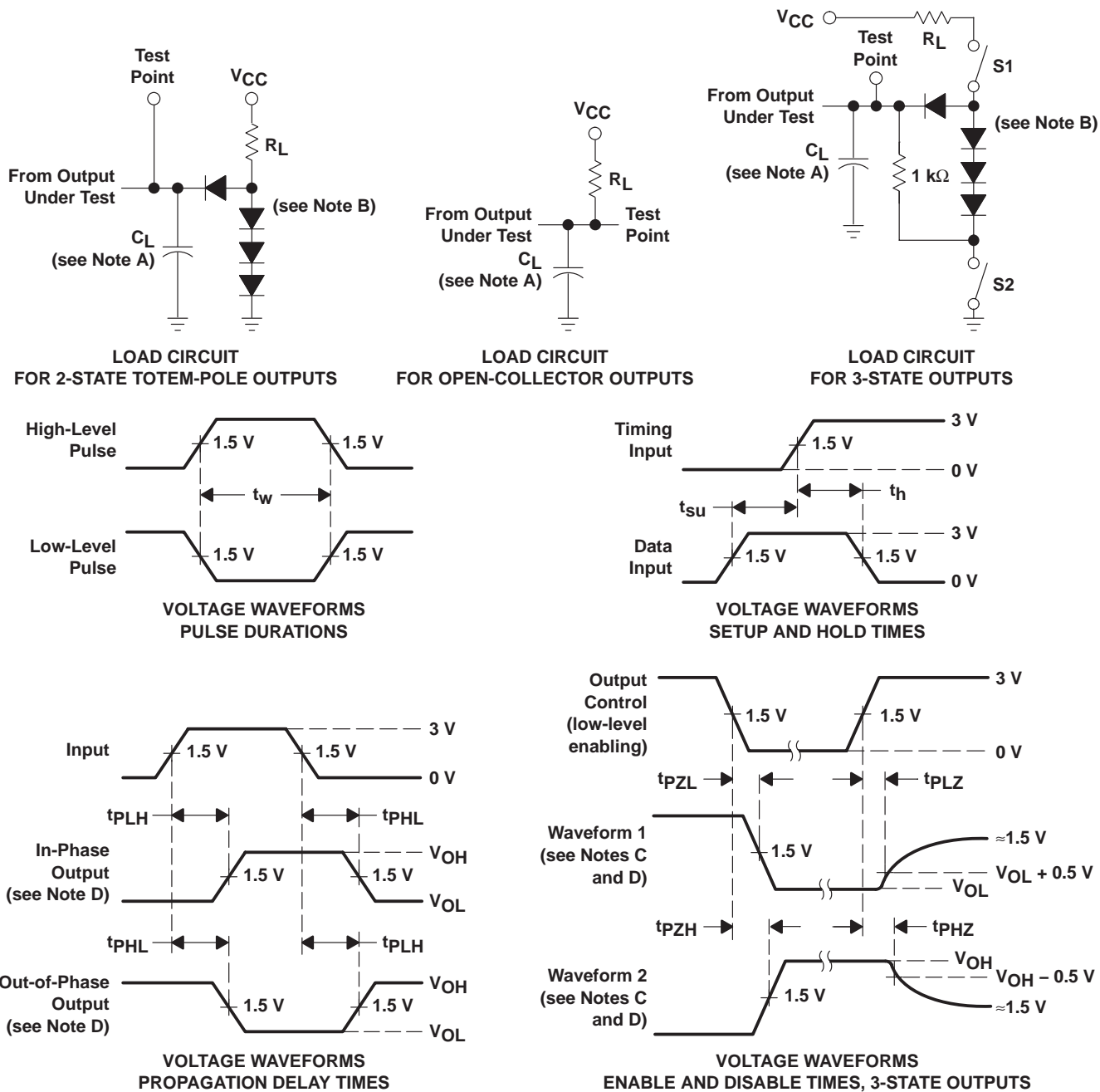
| PARAMETER† | FROM (INPUT) | TO (OUTPUT) | WAVEFORM | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|------------|-----------------|----------------|---------------------|--|-----|-----|-----|------|
| tPLH | 1–7 | A0, A1, or A2 | In-phase output | C _L = 15 pF, R _L = 2 kΩ | 14 | 18 | ns | |
| tPHL | | | | | 15 | 25 | | |
| tPLH | 1–7 | A0, A1, or A2 | Out-of-phase output | | 20 | 36 | ns | |
| tPHL | | | | | 16 | 29 | | |
| tPLH | 0–7 | EO | Out-of-phase output | | 7 | 18 | ns | |
| tPHL | | | | | 25 | 40 | | |
| tPLH | 0–7 | GS | In-phase output | | 35 | 55 | ns | |
| tPHL | | | | | 9 | 21 | | |
| tPLH | EI | A0, A1, or A2 | In-phase output | | 16 | 25 | ns | |
| tPHL | | | | | 12 | 25 | | |
| tPLH | EI | GS | In-phase output | | 12 | 17 | ns | |
| tPHL | | | | | 14 | 36 | | |
| tPLH | EI | EO | In-phase output | | 12 | 21 | ns | |
| tPHL | | | | | 23 | 35 | | |

† t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

PARAMETER MEASUREMENT INFORMATION

SERIES 54/74 DEVICES



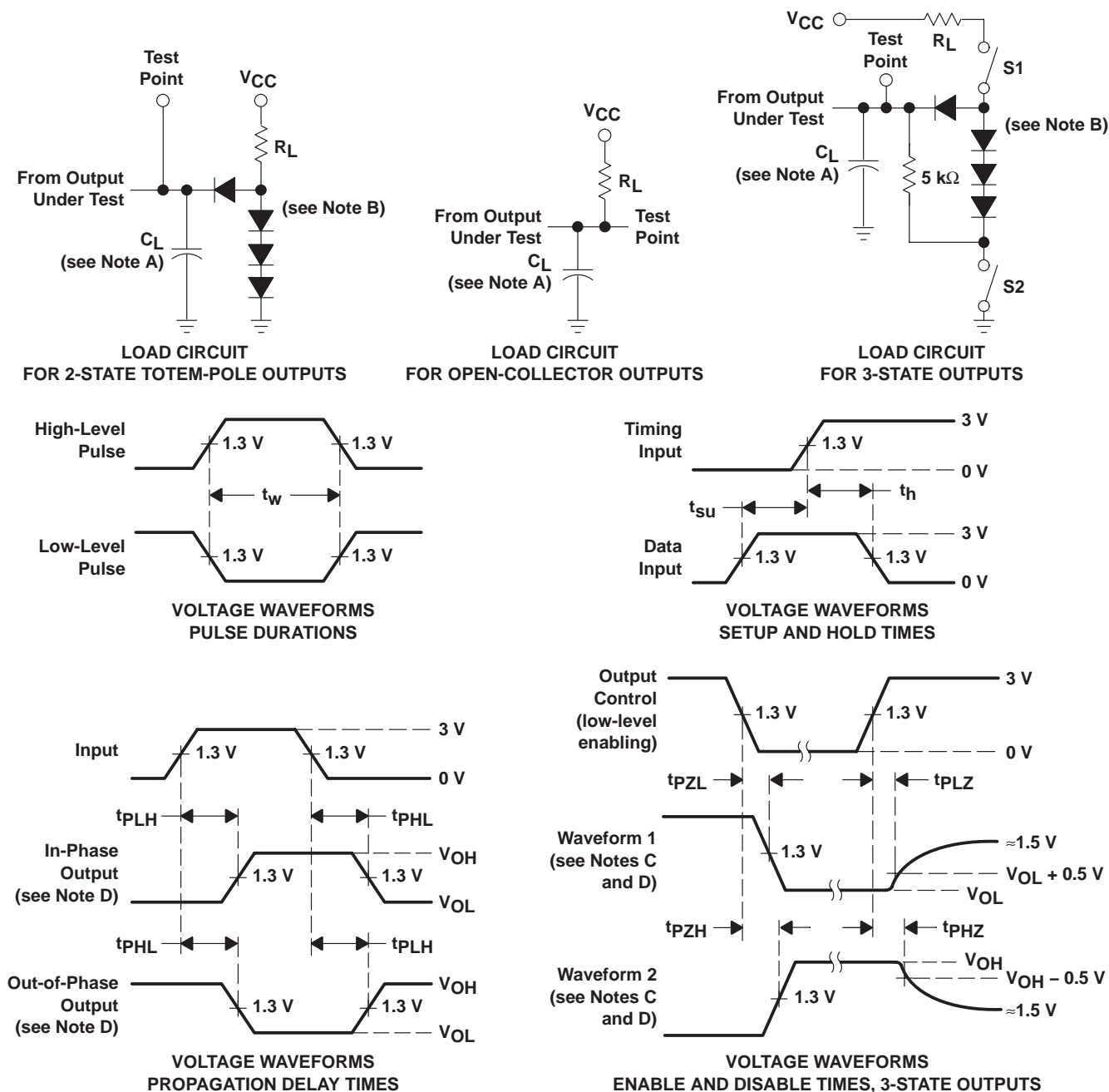
- NOTES: A. C_L includes probe and jig capacitance.
B. All diodes are 1N3064 or equivalent.
C. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
D. S1 and S2 are closed for t_{PLH} , t_{PHL} , t_{PHZ} , and t_{PLZ} ; S1 is open, and S2 is closed for t_{PZH} ; S1 is closed, and S2 is open for t_{PZL} .
E. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O \approx 50 \Omega$; t_r and $t_f \leq 7$ ns for Series 54/74 devices and t_r and $t_f \leq 2.5$ ns for Series 54S/74S devices.
F. The outputs are measured one at a time, with one input transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

SN54147, SN54148, SN54LS147, SN54LS148
SN74147, SN74148 (TIM9907), SN74LS147, SN74LS148
10-LINE TO 4-LINE AND 8-LINE TO 3-LINE PRIORITY ENCODERS

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PARAMETER MEASUREMENT INFORMATION
SERIES 54LS/74LS DEVICES



- NOTES: A. C_L includes probe and jig capacitance.
B. All diodes are 1N3064 or equivalent.
C. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
D. S1 and S2 are closed for t_{PLH} , t_{PHL} , t_{PHZ} , and t_{PZL} ; S1 is open, and S2 is closed for t_{PZH} ; S1 is closed, and S2 is open for t_{PZL} .
E. Phase relationships between inputs and outputs have been chosen arbitrarily for these examples.
F. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O \approx 50 \Omega$, $t_r \leq 1.5 \text{ ns}$, $t_f \leq 2.6 \text{ ns}$.
G. The outputs are measured one at a time, with one input transition per measurement.

Figure 2. Load Circuits and Voltage Waveforms

APPLICATION INFORMATION

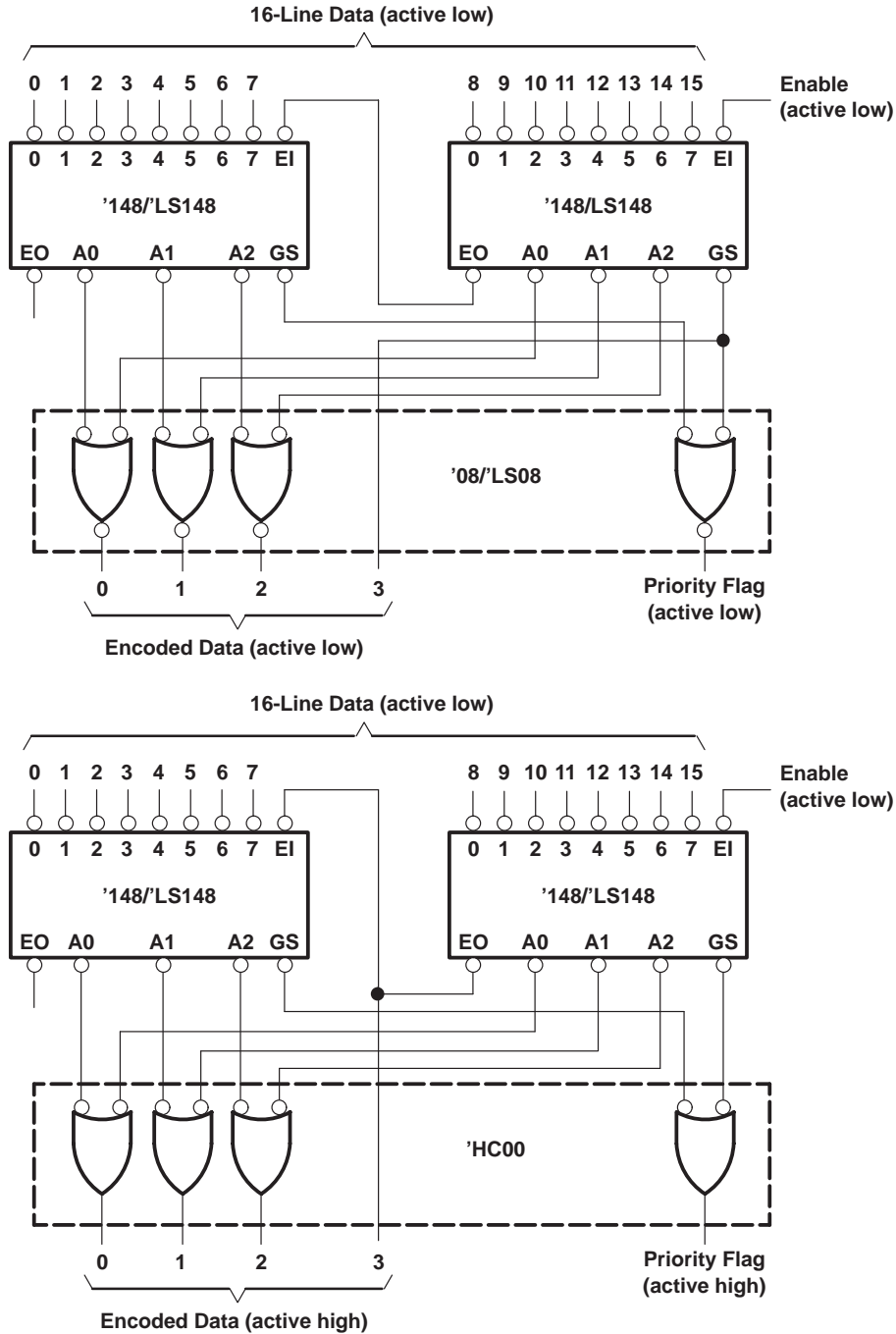


Figure 3. Priority Encoder for 16 Bits

Because the '147/LS147 and '148/LS148 devices are combinational logic circuits, wrong addresses can appear during input transients. Moreover, for the '148/LS148 devices, a change from high to low at EI can cause a transient low on GS when all inputs are high. This must be considered when strobing the outputs.

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 78027012A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 7802701EA | ACTIVE | CDIP | J | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| 7802701FA | ACTIVE | CFP | W | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/36001B2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/36001BEA | ACTIVE | CDIP | J | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| JM38510/36001BFA | ACTIVE | CFP | W | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN54148J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI |
| SN54LS148J | ACTIVE | CDIP | J | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SN74147N | OBSOLETE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| SN74148J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI |
| SN74148N | OBSOLETE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| SN74148N3 | OBSOLETE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| SN74LS147DR | OBSOLETE | SOIC | D | 16 | | TBD | Call TI | Call TI |
| SN74LS147N | OBSOLETE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| SN74LS148D | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LS148DE4 | ACTIVE | SOIC | D | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LS148DR | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LS148DRE4 | ACTIVE | SOIC | D | 16 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LS148J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI |
| SN74LS148N | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74LS148N3 | OBSOLETE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| SN74LS148NE4 | ACTIVE | PDIP | N | 16 | 25 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN74LS148NSR | ACTIVE | SO | NS | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN74LS148NSRE4 | ACTIVE | SO | NS | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SNJ54148J | OBSOLETE | CDIP | J | 16 | | TBD | Call TI | Call TI |
| SNJ54148W | OBSOLETE | CFP | W | 16 | | TBD | Call TI | Call TI |
| SNJ54LS148FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54LS148J | ACTIVE | CDIP | J | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |
| SNJ54LS148W | ACTIVE | CFP | W | 16 | 1 | TBD | Call TI | Level-NC-NC-NC |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check

<http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| PINS ** DIM | 14 | 16 | 18 | 20 |
|----------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK

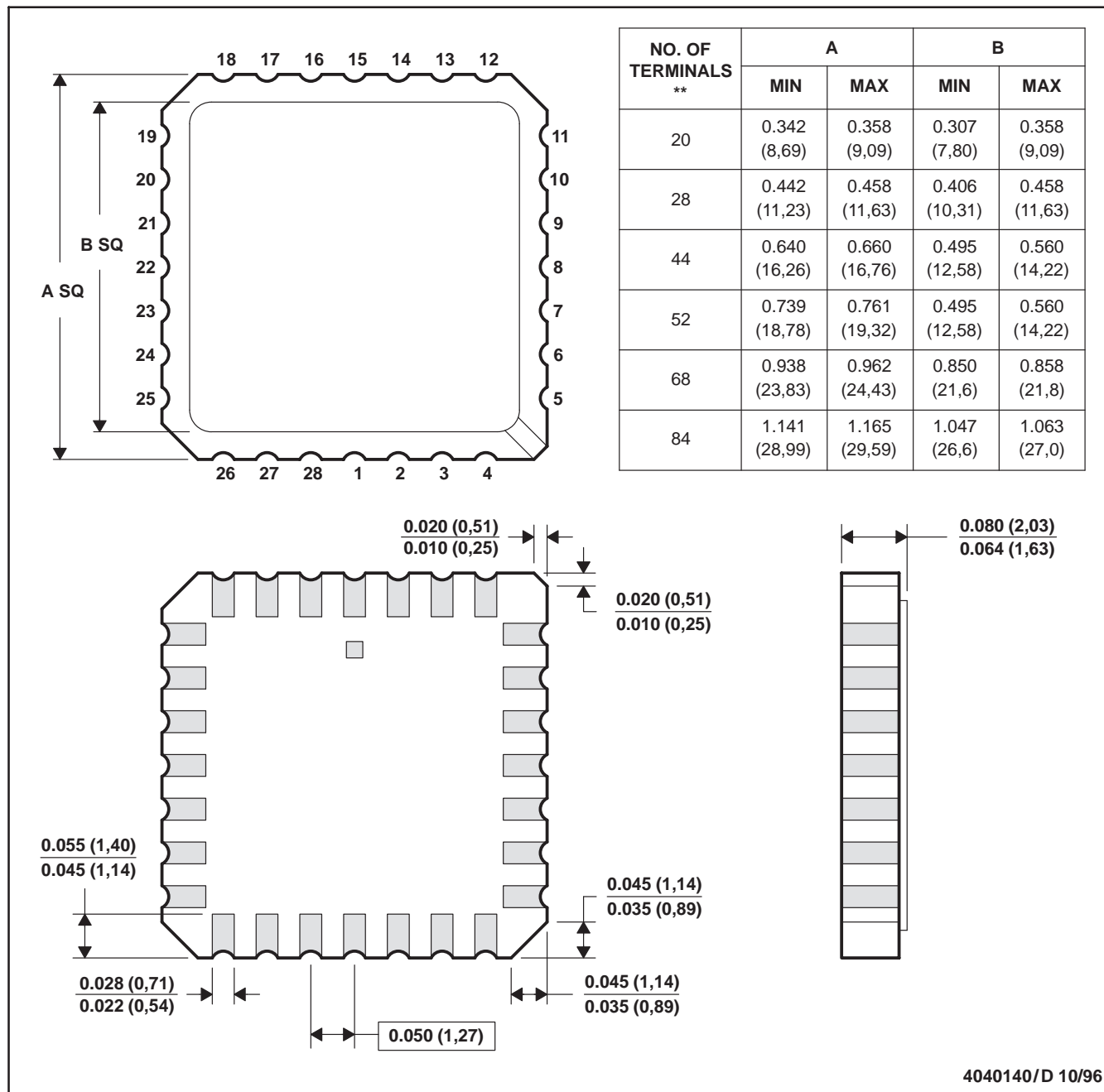


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD 1835 GDFP1-F16 and JEDEC MO-092AC

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



| PINS ** | 14 | 16 | 18 | 20 |
|---------------------|------------------|------------------|------------------|------------------|
| DIM | | | | |
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS-001 VARIATION | AA | BB | AC | AD |



14/18 Pin Only
20 Pin vendor option

4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



4040047-4/F 07/2004

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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