

SN5404, SN54LS04, SN54S04, SN7404, SN74LS04, SN74S04 HEX INVERTERS

SDLS029C – DECEMBER 1983 – REVISED JANUARY 2004

- Dependable Texas Instruments Quality and Reliability

description/ordering information

These devices contain six independent inverters.

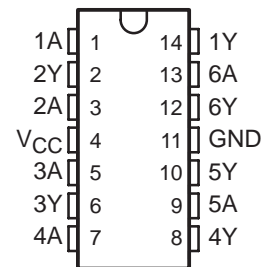
SN5404 . . . J PACKAGE
SN54LS04, SN54S04 . . . J OR W PACKAGE
SN7404, SN74S04 . . . D, N, OR NS PACKAGE
SN74LS04 . . . D, DB, N, OR NS PACKAGE

(TOP VIEW)



SN5404 . . . W PACKAGE

(TOP VIEW)



SN54LS04, SN54S04 . . . FK PACKAGE

(TOP VIEW)



NC – No internal connection



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

**SN5404, SN54LS04, SN54S04,
SN7404, SN74LS04, SN74S04
HEX INVERTERS**

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ORDERING INFORMATION

| T_A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------------|-----------------|---------------|------------------------------|-------------------------|
| 0°C to 70°C | PDIP – N | Tube | SN7404N | SN7404N |
| | | Tube | SN74LS04N | SN74LS04N |
| | | Tube | SN74S04N | SN74S04N |
| | SOIC – D | Tube | SN7404D | 7404 |
| | | Tape and reel | SN7404DR | |
| | | Tube | SN74LS04D | LS04 |
| | | Tape and reel | SN74LS04DR | |
| | | Tube | SN74S04D | S04 |
| | | Tape and reel | SN74S04DR | |
| | SOP – NS | Tape and reel | SN7404NSR | SN7404 |
| | | Tape and reel | SN74LS04NSR | 74LS04 |
| | | Tape and reel | SN74S04NSR | 74S04 |
| | SSOP – DB | Tape and reel | SN74LS04DBR | LS04 |
| | –55°C to 125°C | CDIP – J | Tube | SN5404J |
| Tube | | | SNJ5404J | SNJ5404J |
| Tube | | | SN54LS04J | SN54LS04J |
| Tube | | | SN54S04J | SN54S04J |
| Tube | | | SNJ54LS04J | SNJ54LS04J |
| Tube | | | SNJ54S04J | SNJ54S04J |
| CFP – W | | Tube | SNJ5404W | SNJ5404W |
| | | Tube | SNJ54LS04W | SNJ54LS04W |
| | | Tube | SNJ54S04W | SNJ54S04W |
| LCCC – FK | | Tube | SNJ54LS04FK | SNJ54LS04FK |
| | | Tube | SNJ54S04FK | SNJ54S04FK |

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

**FUNCTION TABLE
(each inverter)**

| INPUT A | OUTPUT Y |
|--------------------|---------------------|
| H | L |
| L | H |



**SN5404, SN54LS04, SN54S04,
SN7404, SN74LS04, SN74S04
HEX INVERTERS**

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logic diagram (positive logic)



$$Y = \bar{A}$$

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schematics (each gate)



Resistor values shown are nominal.

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

| | |
|--|----------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage, V_I : '04, 'S04 | 5.5 V |
| 'LS04 | 7 V |
| Package thermal impedance, θ_{JA} (see Note 2): D package | 86°C/W |
| DB package | 96°C/W |
| N package | 80°C/W |
| NS package | 76°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. This 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 are with respect to network ground terminal.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

| | | SN5404 | | | SN7404 | | | UNIT |
|----------|--------------------------------|--------|-----|-----|--------|-----|------|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | | 0.8 | | | V |
| I_{OH} | High-level output current | | | | -0.4 | | | mA |
| I_{OL} | Low-level output current | | | | 16 | | | mA |
| T_A | Operating free-air temperature | -55 | | | 125 | | | °C |

NOTE 3: 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.

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

| PARAMETER | TEST CONDITIONS‡ | SN5404 | | | SN7404 | | | UNIT |
|----------------------|---|--------|------|-----|--------|------|-----|------|
| | | MIN | TYP§ | MAX | MIN | TYP§ | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$ | -1.5 | | | -1.5 | | | V |
| V_{OH} | $V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -0.4 \text{ mA}$ | 2.4 | 3.4 | | 2.4 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 16 \text{ mA}$ | | 0.2 | 0.4 | | 0.2 | 0.4 | V |
| I_I | $V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$ | 1 | | | 1 | | | mA |
| I_{IH} | $V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$ | 40 | | | 40 | | | µA |
| I_{IL} | $V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$ | -1.6 | | | -1.6 | | | mA |
| I_{OS}^{\parallel} | $V_{CC} = \text{MAX}$ | -20 | | -55 | -18 | | -55 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}$, $V_I = 0 \text{ V}$ | | 6 | 12 | | 6 | 12 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}$, $V_I = 4.5 \text{ V}$ | | 18 | 33 | | 18 | 33 | mA |

‡ 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.



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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN5404 SN7404 | | | UNIT |
|-----------|--------------|-------------|--|------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t_{PLH} | A | Y | $R_L = 400\ \Omega$, $C_L = 15\text{ pF}$ | 12 | | 22 | ns |
| t_{PHL} | | | | 8 | | 15 | |

recommended operating conditions (see Note 3)

| | | SN54LS04 | | | SN74LS04 | | | UNIT |
|----------|--------------------------------|----------|-----|-----|----------|-----|------|------------------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | 0.7 | | | 0.8 | | | V |
| I_{OH} | High-level output current | -0.4 | | | -0.4 | | | mA |
| I_{OL} | Low-level output current | 4 | | | 8 | | | mA |
| T_A | Operating free-air temperature | -55 | | | 125 | | | $^\circ\text{C}$ |

NOTE 3: 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.

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

| PARAMETER | TEST CONDITIONS† | SN54LS04 | | | SN74LS04 | | | UNIT |
|-----------|---|------------------------|------|------|----------|------|------|---------------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}$, $I_I = -18\text{ mA}$ | -1.5 | | | -1.5 | | | V |
| V_{OH} | $V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$, $I_{OH} = -0.4\text{ mA}$ | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}$, $V_{IH} = 2\text{ V}$ | $I_{OL} = 4\text{ mA}$ | | 0.4 | | 0.4 | | V |
| | | $I_{OL} = 8\text{ mA}$ | | | | 0.25 | | |
| I_I | $V_{CC} = \text{MAX}$, $V_I = 7\text{ V}$ | 0.1 | | | 0.1 | | | mA |
| I_{IH} | $V_{CC} = \text{MAX}$, $V_I = 2.7\text{ V}$ | 20 | | | 20 | | | μA |
| I_{IL} | $V_{CC} = \text{MAX}$, $V_I = 0.4\text{ V}$ | -0.4 | | | -0.4 | | | mA |
| $I_{OS}§$ | $V_{CC} = \text{MAX}$ | -20 | | -100 | -20 | | -100 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}$, $V_I = 0\text{ V}$ | 1.2 | | 2.4 | 1.2 | | 2.4 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}$, $V_I = 4.5\text{ V}$ | 3.6 | | 6.6 | 3.6 | | 6.6 | mA |

† 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, and the duration of the short-circuit should not exceed one second.

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN54LS04 SN74LS04 | | | UNIT |
|-----------|--------------|-------------|---|----------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t_{PLH} | A | Y | $R_L = 2\text{ k}\Omega$, $C_L = 15\text{ pF}$ | 9 | | 15 | ns |
| t_{PHL} | | | | 10 | | 15 | |



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recommended operating conditions (see Note 3)

| | | SN54S04 | | | SN74S04 | | | UNIT |
|----------|--------------------------------|---------|-----|-----|---------|-----|------|------|
| | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V_{IH} | High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I_{OH} | High-level output current | | | -1 | | | -1 | mA |
| I_{OL} | Low-level output current | | | 20 | | | 20 | mA |
| T_A | Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

NOTE 3: 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.

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

| PARAMETER | TEST CONDITIONS† | SN54S04 | | | SN74S04 | | | UNIT |
|-----------|---|---------|------|------|---------|------|------|------|
| | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| V_{IK} | $V_{CC} = \text{MIN}$, $I_I = -18 \text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -1 \text{ mA}$ | 2.5 | 3.4 | | 2.7 | 3.4 | | V |
| V_{OL} | $V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 20 \text{ mA}$ | | | 0.5 | | | 0.5 | V |
| I_I | $V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$ | | | 1 | | | 1 | mA |
| I_{IH} | $V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$ | | | 50 | | | 50 | μA |
| I_{IL} | $V_{CC} = \text{MAX}$, $V_I = 0.5 \text{ V}$ | | | -2 | | | -2 | mA |
| $I_{OS}§$ | $V_{CC} = \text{MAX}$ | -40 | | -100 | -40 | | -100 | mA |
| I_{CCH} | $V_{CC} = \text{MAX}$, $V_I = 0 \text{ V}$ | | 15 | 24 | | 15 | 24 | mA |
| I_{CCL} | $V_{CC} = \text{MAX}$, $V_I = 4.5 \text{ V}$ | | 30 | 54 | | 30 | 54 | mA |

† 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, and the duration of the short-circuit should not exceed one second.

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | SN54S04 SN74S04 | | | UNIT |
|-----------|--------------|-------------|--|--------------------|-----|-----|------|
| | | | | MIN | TYP | MAX | |
| t_{PLH} | A | Y | $R_L = 280 \Omega$, $C_L = 15 \text{ pF}$ | 3 | | 4.5 | ns |
| t_{PHL} | | | | 3 | | 5 | |
| t_{PLH} | A | Y | $R_L = 280 \Omega$, $C_L = 50 \text{ pF}$ | 4.5 | | 5 | ns |
| t_{PHL} | | | | 5 | | | |

**SN5404, SN54LS04, SN54S04,
SN7404, SN74LS04, SN74S04
HEX INVERTERS**

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**PARAMETER MEASUREMENT INFORMATION
SERIES 54/74 AND 54S/74S 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. 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

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_{PLZ} ; 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 MHz, $Z_O \approx 50 \Omega$, $t_r \leq 1.5$ ns, $t_f \leq 2.6$ ns.
 G. The outputs are measured one at a time, with one input transition per measurement.

Figure 2. Load Circuits and Voltage Waveforms

PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| JM38510/00105BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BCA |
| JM38510/00105BCA.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BCA |
| JM38510/00105BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BDA |
| JM38510/00105BDA.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BDA |
| JM38510/07003BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BCA |
| JM38510/07003BCA.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BCA |
| JM38510/07003BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BDA |
| JM38510/07003BDA.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BDA |
| JM38510/30003B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003B2A |
| JM38510/30003B2A.A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003B2A |
| JM38510/30003BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BCA |
| JM38510/30003BCA.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BCA |
| JM38510/30003BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BDA |
| JM38510/30003BDA.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BDA |
| JM38510/30003SCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003SCA |
| JM38510/30003SCA.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003SCA |

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| M38510/00105BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BCA |
| M38510/00105BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 00105BDA |
| M38510/07003BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BCA |
| M38510/07003BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 07003BDA |
| M38510/30003B2A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003B2A |
| M38510/30003BCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BCA |
| M38510/30003BDA | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003BDA |
| M38510/30003SCA | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | JM38510/ 30003SCA |
| SN5404J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN5404J |
| SN5404J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN5404J |
| SN54LS04J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS04J |
| SN54LS04J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54LS04J |
| SN54S04J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S04J |
| SN54S04J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SN54S04J |
| SN7404D | Obsolete | Production | SOIC (D) 14 | - | - | Call TI | Call TI | 0 to 70 | 7404 |
| SN7404DR | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 7404 |
| SN7404DR.A | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 7404 |
| SN7404N | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7404N |
| SN7404N.A | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7404N |
| SN7404NE4 | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN7404N |
| SN74LS04D | Active | Production | SOIC (D) 14 | 50 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04D.A | Active | Production | SOIC (D) 14 | 50 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04DBR | Active | Production | SSOP (DB) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | - | LS04 |
| SN74LS04DBR.A | Active | Production | SSOP (DB) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04DG4 | Active | Production | SOIC (D) 14 | 50 TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|-----------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| SN74LS04DR | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04DR.A | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04DRG4 | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | LS04 |
| SN74LS04N | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS04N |
| SN74LS04N.A | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS04N |
| SN74LS04NE4 | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74LS04N |
| SN74LS04NSR | Active | Production | SOP (NS) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS04 |
| SN74LS04NSR.A | Active | Production | SOP (NS) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74LS04 |
| SN74S04D | Obsolete | Production | SOIC (D) 14 | - | - | Call TI | Call TI | 0 to 70 | S04 |
| SN74S04DR | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | S04 |
| SN74S04DR.A | Active | Production | SOIC (D) 14 | 2500 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | S04 |
| SN74S04N | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74S04N |
| SN74S04N.A | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74S04N |
| SN74S04NE4 | Active | Production | PDIP (N) 14 | 25 TUBE | Yes | NIPDAU | N/A for Pkg Type | 0 to 70 | SN74S04N |
| SN74S04NSR | Active | Production | SOP (NS) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74S04 |
| SN74S04NSR.A | Active | Production | SOP (NS) 14 | 2000 LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | 0 to 70 | 74S04 |
| SNJ5404J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5404J |
| SNJ5404J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5404J |
| SNJ5404W | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5404W |
| SNJ5404W.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ5404W |
| SNJ54LS04FK | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS 04FK |
| SNJ54LS04FK.A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS 04FK |
| SNJ54LS04J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS04J |
| SNJ54LS04J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS04J |
| SNJ54LS04W | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS04W |
| SNJ54LS04W.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54LS04W |
| SNJ54S04FK | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S 04FK |
| SNJ54S04FK.A | Active | Production | LCCC (FK) 20 | 55 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S 04FK |

| Orderable part number | Status (1) | Material type (2) | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| SNJ54S04J | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S04J |
| SNJ54S04J.A | Active | Production | CDIP (J) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S04J |
| SNJ54S04W | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S04W |
| SNJ54S04W.A | Active | Production | CFP (W) 14 | 25 TUBE | No | SNPB | N/A for Pkg Type | -55 to 125 | SNJ54S04W |

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF SN5404, SN54LS04, SN54LS04-SP, SN54S04, SN7404, SN74LS04, SN74S04 :

- Catalog : [SN7404](#), [SN74LS04](#), [SN54LS04](#), [SN74S04](#)

- Military : [SN5404](#), [SN54LS04](#), [SN54S04](#)

- Space : [SN54LS04-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

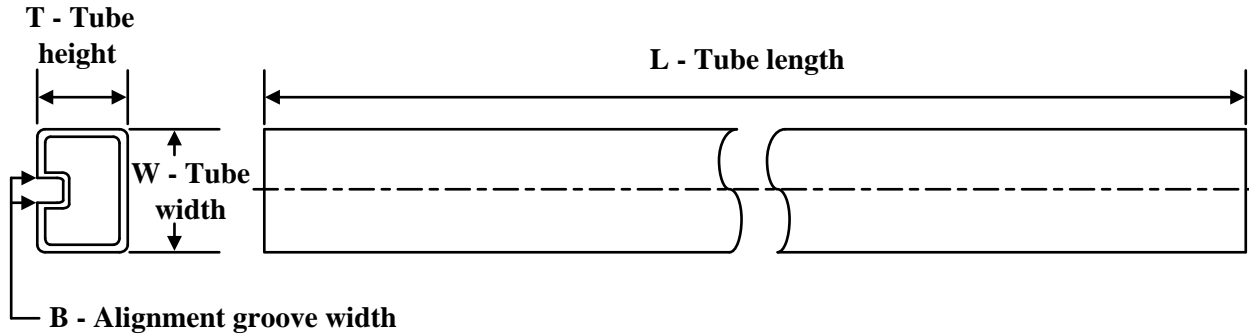

*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN7404DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LS04DBR | SSOP | DB | 14 | 2000 | 330.0 | 16.4 | 8.35 | 6.6 | 2.4 | 12.0 | 16.0 | Q1 |
| SN74LS04DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74LS04NSR | SOP | NS | 14 | 2000 | 330.0 | 16.4 | 8.1 | 10.4 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74S04DR | SOIC | D | 14 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74S04NSR | SOP | NS | 14 | 2000 | 330.0 | 16.4 | 8.1 | 10.4 | 2.5 | 12.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN7404DR | SOIC | D | 14 | 2500 | 353.0 | 353.0 | 32.0 |
| SN74LS04DBR | SSOP | DB | 14 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74LS04DR | SOIC | D | 14 | 2500 | 353.0 | 353.0 | 32.0 |
| SN74LS04NSR | SOP | NS | 14 | 2000 | 353.0 | 353.0 | 32.0 |
| SN74S04DR | SOIC | D | 14 | 2500 | 353.0 | 353.0 | 32.0 |
| SN74S04NSR | SOP | NS | 14 | 2000 | 353.0 | 353.0 | 32.0 |

TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|--------------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| JM38510/00105BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/00105BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/07003BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/07003BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30003B2A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| JM38510/30003B2A.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| JM38510/30003BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| JM38510/30003BDA.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/00105BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/07003BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| M38510/30003B2A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| M38510/30003BDA | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SN7404N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7404N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7404N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7404N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7404NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN7404NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04D | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN74LS04D.A | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN74LS04DG4 | D | SOIC | 14 | 50 | 506.6 | 8 | 3940 | 4.32 |
| SN74LS04N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74LS04NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S04N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S04N | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|---------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| SN74S04N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S04N.A | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S04NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SN74S04NE4 | N | PDIP | 14 | 25 | 506 | 13.97 | 11230 | 4.32 |
| SNJ5404W | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ5404W.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54LS04FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54LS04FK.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54LS04W | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54LS04W.A | W | CFP | 14 | 25 | 506.98 | 26.16 | 6220 | NA |
| SNJ54S04FK | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |
| SNJ54S04FK.A | FK | LCCC | 20 | 55 | 506.98 | 12.06 | 2030 | NA |

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.



D0014A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



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

W (R-GDFP-F14)

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-F14



NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-150.

EXAMPLE BOARD LAYOUT

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220762/A 05/2024

NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220762/A 05/2024

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4229370VA\

J 14

GENERIC PACKAGE VIEW
CDIP - 5.08 mm max height
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

J0014A



PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



4214771/A 05/2017

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