

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

SDLS029C – DECEMBER 1983 – REVISED JANUARY 2004

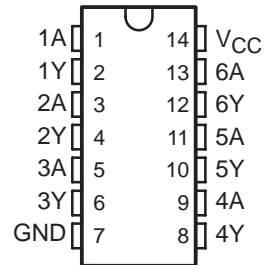
- Dependable Texas Instruments Quality and Reliability

## description/ordering information

These devices contain six independent inverters.

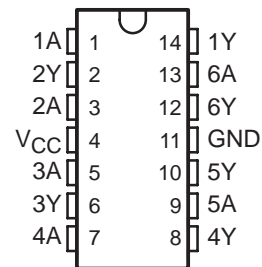
SN5404 . . . J PACKAGE  
SN54LS04, SN54S04 . . . J OR W PACKAGE  
SN7404, SN74S04 . . . D, N, OR NS PACKAGE  
SN74LS04 . . . D, DB, N, OR NS PACKAGE

(TOP VIEW)



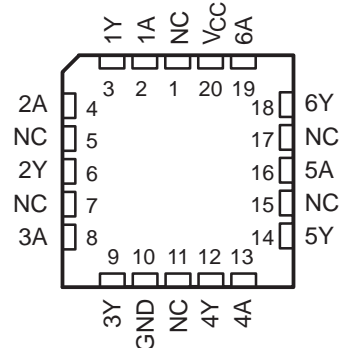
SN5404 . . . W PACKAGE

(TOP VIEW)



SN54LS04, SN54S04 . . . FK PACKAGE

(TOP VIEW)



NC – No internal connection



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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.

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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**

| <b>T<sub>A</sub></b> | <b>PACKAGE†</b> |               | <b>ORDERABLE PART NUMBER</b> | <b>TOP-SIDE MARKING</b> |
|----------------------|-----------------|---------------|------------------------------|-------------------------|
| 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](http://www.ti.com/sc/package).

**FUNCTION TABLE  
(each inverter)**

| <b>INPUT<br/>A</b> | <b>OUTPUT<br/>Y</b> |
|--------------------|---------------------|
| H                  | L                   |
| L                  | H                   |



**SN5404, SN54LS04, SN54S04,  
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logic diagram (positive logic)

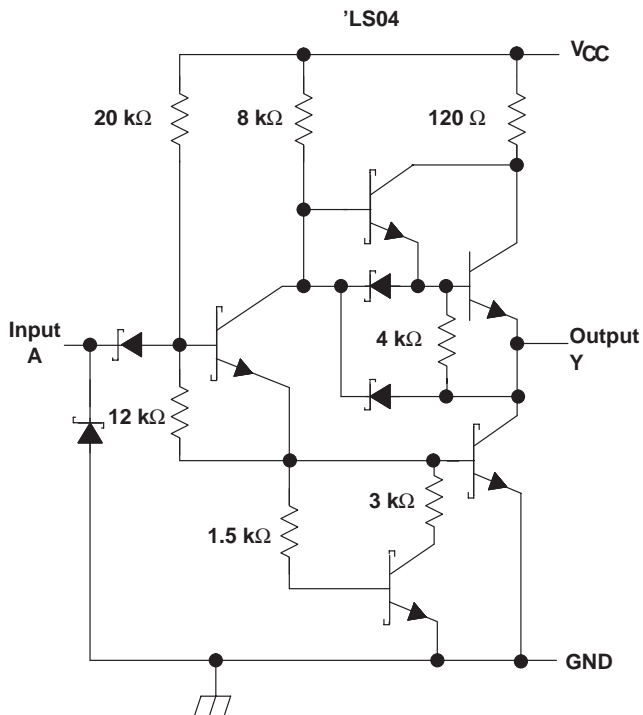


$$Y = \bar{A}$$

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

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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, $\theta_{JA}$ (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}\ \ $ | $V_{CC} = \text{MAX}$   | -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.



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

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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<br>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 |     | 0        | 70  |      | $^\circ\text{C}$ |

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 0.5 |     |               |
| $I_I$     | $V_{CC} = \text{MAX}$ , $V_I = 7\text{ V}$                                | 0.1                    |      |         | 0.1      |          |     | mA            |
| $I_{IH}$  | $V_{CC} = \text{MAX}$ , $V_I = 2.7\text{ V}$                              | 20                     |      |         | 20       |          |     | $\mu\text{A}$ |
| $I_{IL}$  | $V_{CC} = \text{MAX}$ , $V_I = 0.4\text{ V}$                              | -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 |          | 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 |          | 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<br>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  |      |



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

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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  |      |
| $V_{IK}$  | $V_{CC} = \text{MIN}$ ,<br>$I_I = -18 \text{ mA}$                                 |         |      | -1.2 |         |      | -1.2 | V    |
| $V_{OH}$  | $V_{CC} = \text{MIN}$ ,<br>$V_{IL} = 0.8 \text{ V}$ ,<br>$I_{OH} = -1 \text{ mA}$ | 2.5     | 3.4  |      | 2.7     | 3.4  |      | V    |
| $V_{OL}$  | $V_{CC} = \text{MIN}$ ,<br>$V_{IH} = 2 \text{ V}$ ,<br>$I_{OL} = 20 \text{ mA}$   |         |      | 0.5  |         |      | 0.5  | V    |
| $I_I$     | $V_{CC} = \text{MAX}$ ,<br>$V_I = 5.5 \text{ V}$                                  |         |      | 1    |         |      | 1    | mA   |
| $I_{IH}$  | $V_{CC} = \text{MAX}$ ,<br>$V_I = 2.7 \text{ V}$                                  |         |      | 50   |         |      | 50   | μA   |
| $I_{IL}$  | $V_{CC} = \text{MAX}$ ,<br>$V_I = 0.5 \text{ V}$                                  |         |      | -2   |         |      | -2   | mA   |
| $I_{OS}§$ | $V_{CC} = \text{MAX}$   | -40     |      | -100 | -40     |      | -100 | mA   |
| $I_{CCH}$ | $V_{CC} = \text{MAX}$ ,<br>$V_I = 0 \text{ V}$                                    |         | 15   | 24   |         | 15   | 24   | mA   |
| $I_{CCL}$ | $V_{CC} = \text{MAX}$ ,<br>$V_I = 4.5 \text{ V}$                                  |         | 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<br>SN74S04 |     |     | UNIT |
|-----------|--------------|-------------|---|--------------------|-----|-----|------|
|           |              |             |   | MIN                | TYP | MAX |      |
| $t_{PLH}$ | A            | Y           | $R_L = 280 \Omega$ ,<br>$C_L = 15 \text{ pF}$ | 3                  |     | 4.5 | ns   |
| $t_{PHL}$ |              |             |   | 3                  |     | 5   |      |
| $t_{PLH}$ | A            | Y           | $R_L = 280 \Omega$ ,<br>$C_L = 50 \text{ pF}$ | 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 Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)  | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| JM38510/00105BCA | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>00105BCA    | <a href="#">Samples</a> |
| JM38510/00105BDA | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>00105BDA    | <a href="#">Samples</a> |
| JM38510/07003BCA | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>07003BCA    | <a href="#">Samples</a> |
| JM38510/07003BDA | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>07003BDA    | <a href="#">Samples</a> |
| JM38510/30003B2A | ACTIVE        | LCCC         | FK              | 20   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003B2A    | <a href="#">Samples</a> |
| JM38510/30003BCA | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003BCA    | <a href="#">Samples</a> |
| JM38510/30003BDA | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003BDA    | <a href="#">Samples</a> |
| JM38510/30003SCA | ACTIVE        | CDIP         | J               | 14   | 25          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003SCA    | <a href="#">Samples</a> |
| M38510/00105BCA  | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>00105BCA    | <a href="#">Samples</a> |
| M38510/00105BDA  | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>00105BDA    | <a href="#">Samples</a> |
| M38510/07003BCA  | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>07003BCA    | <a href="#">Samples</a> |
| M38510/07003BDA  | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>07003BDA    | <a href="#">Samples</a> |
| M38510/30003B2A  | ACTIVE        | LCCC         | FK              | 20   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003B2A    | <a href="#">Samples</a> |
| M38510/30003BCA  | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003BCA    | <a href="#">Samples</a> |
| M38510/30003BDA  | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003BDA    | <a href="#">Samples</a> |
| M38510/30003SCA  | ACTIVE        | CDIP         | J               | 14   | 25          | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | JM38510/<br>30003SCA    | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)  | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SN5404J          | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SN5404J                 | <a href="#">Samples</a> |
| SN54LS04J        | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SN54LS04J               | <a href="#">Samples</a> |
| SN54S04J         | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SN54S04J                | <a href="#">Samples</a> |
| SN7404D          | ACTIVE        | SOIC         | D               | 14   | 50          | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | 7404                    | <a href="#">Samples</a> |
| SN7404DR         | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | 7404                    | <a href="#">Samples</a> |
| SN7404N          | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN7404N                 | <a href="#">Samples</a> |
| SN7404NE4        | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN7404N                 | <a href="#">Samples</a> |
| SN74LS04D        | ACTIVE        | SOIC         | D               | 14   | 50          | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | LS04                    | <a href="#">Samples</a> |
| SN74LS04DBR      | ACTIVE        | SSOP         | DB              | 14   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   |              | LS04                    | <a href="#">Samples</a> |
| SN74LS04DG4      | ACTIVE        | SOIC         | D               | 14   | 50          | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | LS04                    | <a href="#">Samples</a> |
| SN74LS04DR       | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | LS04                    | <a href="#">Samples</a> |
| SN74LS04DRG4     | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | LS04                    | <a href="#">Samples</a> |
| SN74LS04N        | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN74LS04N               | <a href="#">Samples</a> |
| SN74LS04NE4      | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN74LS04N               | <a href="#">Samples</a> |
| SN74LS04NSR      | ACTIVE        | SO           | NS              | 14   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | 74LS04                  | <a href="#">Samples</a> |
| SN74S04D         | ACTIVE        | SOIC         | D               | 14   | 50          | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | S04                     | <a href="#">Samples</a> |
| SN74S04DR        | ACTIVE        | SOIC         | D               | 14   | 2500        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | S04                     | <a href="#">Samples</a> |
| SN74S04N         | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN74S04N                | <a href="#">Samples</a> |
| SN74S04NE4       | ACTIVE        | PDIP         | N               | 14   | 25          | RoHS & Green     | NIPDAU                               | N / A for Pkg Type   | 0 to 70      | SN74S04N                | <a href="#">Samples</a> |
| SN74S04NSR       | ACTIVE        | SO           | NS              | 14   | 2000        | RoHS & Green     | NIPDAU                               | Level-1-260C-UNLIM   | 0 to 70      | 74S04                   | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)  | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|-------------------------|-------------------------|
| SNJ5404J         | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ5404J                | <a href="#">Samples</a> |
| SNJ5404W         | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ5404W                | <a href="#">Samples</a> |
| SNJ54LS04FK      | ACTIVE        | LCCC         | FK              | 20   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54LS04FK             | <a href="#">Samples</a> |
| SNJ54LS04J       | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54LS04J              | <a href="#">Samples</a> |
| SNJ54LS04W       | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54LS04W              | <a href="#">Samples</a> |
| SNJ54S04FK       | ACTIVE        | LCCC         | FK              | 20   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54S04FK              | <a href="#">Samples</a> |
| SNJ54S04J        | ACTIVE        | CDIP         | J               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54S04J               | <a href="#">Samples</a> |
| SNJ54S04W        | ACTIVE        | CFP          | W               | 14   | 1           | Non-RoHS & Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | SNJ54S04W               | <a href="#">Samples</a> |

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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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 | SO           | NS              | 14   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 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  | SO           | NS              | 14   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 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 | 853.0       | 449.0      | 35.0        |
| SN74LS04DBR | SSOP         | DB              | 14   | 2000 | 853.0       | 449.0      | 35.0        |
| SN74LS04DR  | SOIC         | D               | 14   | 2500 | 853.0       | 449.0      | 35.0        |
| SN74LS04NSR | SO           | NS              | 14   | 2000 | 853.0       | 449.0      | 35.0        |
| SN74S04DR   | SOIC         | D               | 14   | 2500 | 853.0       | 449.0      | 35.0        |
| SN74S04NSR  | SO           | NS              | 14   | 2000 | 853.0       | 449.0      | 35.0        |

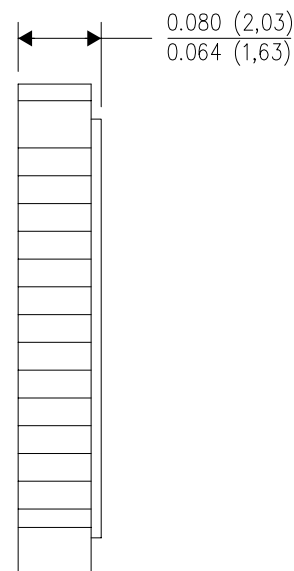
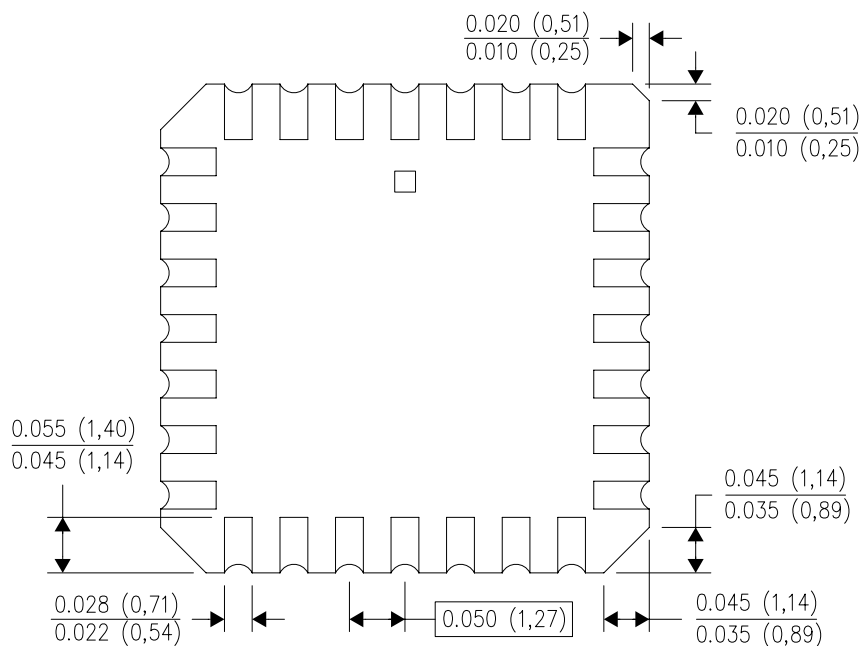
FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF TERMINALS ** | A                |                  | B                |                  |
|---------------------|------------------|------------------|------------------|------------------|
|                     | MIN              | MAX              | MIN              | MAX              |
| 20                  | 0.342<br>(8,69)  | 0.358<br>(9,09)  | 0.307<br>(7,80)  | 0.358<br>(9,09)  |
| 28                  | 0.442<br>(11,23) | 0.458<br>(11,63) | 0.406<br>(10,31) | 0.458<br>(11,63) |
| 44                  | 0.640<br>(16,26) | 0.660<br>(16,76) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 52                  | 0.740<br>(18,78) | 0.761<br>(19,32) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 68                  | 0.938<br>(23,83) | 0.962<br>(24,43) | 0.850<br>(21,6)  | 0.858<br>(21,8)  |
| 84                  | 1.141<br>(28,99) | 1.165<br>(29,59) | 1.047<br>(26,6)  | 1.063<br>(27,0)  |



4040140/D 01/11

- 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. Falls within JEDEC MS-004



# 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

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

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  -  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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.



DB (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE

28 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.  
 D. Falls within JEDEC MO-150

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