

# SN54LS540, SN54LS541, SN74LS540, SN74LS541 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

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- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- P-N-P Inputs Reduce D-C Loading
- Hysteresis at Inputs Improves Noise Margins
- Data Flow-thru Pinout (All Inputs on Opposite Side from Outputs)

## description

These octal buffers and line drivers are designed to have the performance of the popular SN54LS240/SN74LS240 series and, at the same time, offer a pinout having the inputs and outputs on opposite sides of the package. This arrangement greatly enhances printed circuit board layout.

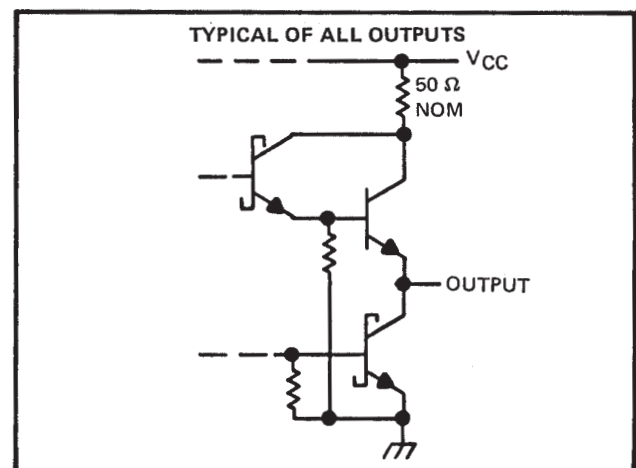
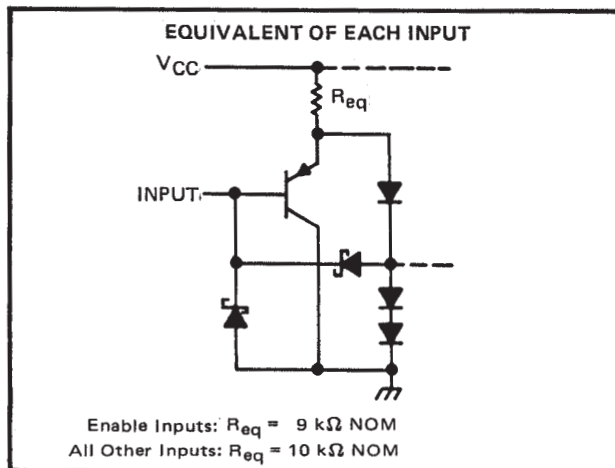
The three-state control gate is a 2-input NOR such that if either  $\overline{G1}$  or  $\overline{G2}$  are high, all eight outputs are in the high-impedance state.

The 'LS540 offers inverting data and the 'LS541 offers true data at the outputs.

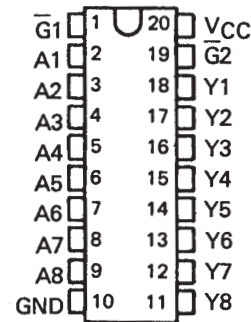
The SN54LS540 and SN54LS541 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74LS540 and SN74LS541 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

| TYPE    | RATED<br>$I_{OL}$<br>(SINK<br>CURRENT) | RATED<br>$I_{OH}$<br>(SOURCE<br>CURRENT) | TYPICAL POWER<br>DISSIPATION<br>(ENABLED) |        |
|---------|----------------------------------------|------------------------------------------|-------------------------------------------|--------|
|         |                                        |                                          | 'LS540                                    | 'LS541 |
| SN54LS' | 12 mA                                  | - 12 mA                                  | 92.5 mW                                   | 120 mW |
| SN74LS' | 24 mA                                  | - 15 mA                                  | 92.5 mW                                   | 120 mW |

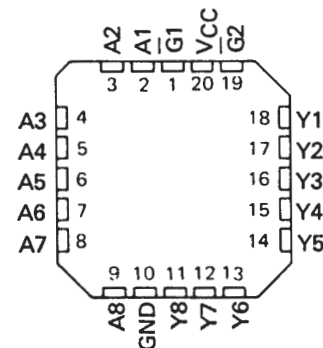
## schematics of inputs and outputs



SN54LS540, SN54LS541 . . . J OR W PACKAGE  
SN74LS540, SN74LS541 . . . DW OR N PACKAGE  
(TOP VIEW)



SN54LS540, SN54LS541 . . . FK PACKAGE  
(TOP VIEW)



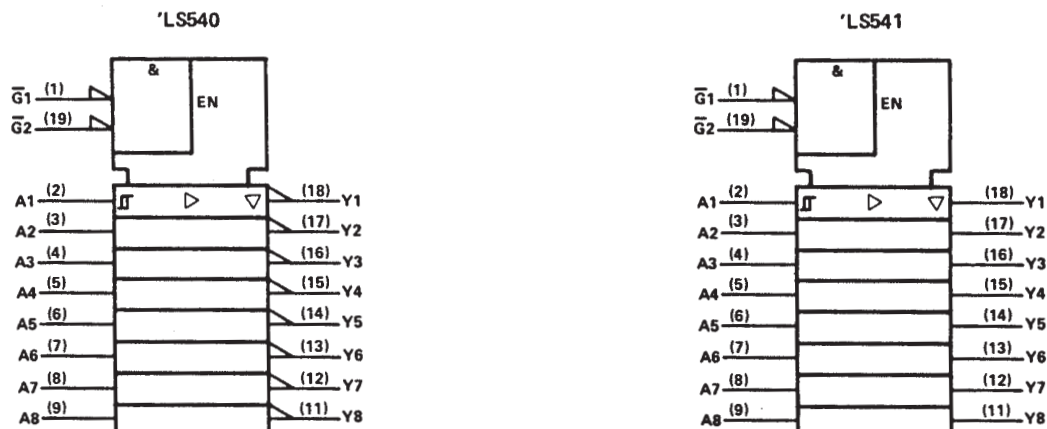
# SN54LS540, SN54LS541, SN74LS540, SN74LS541

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

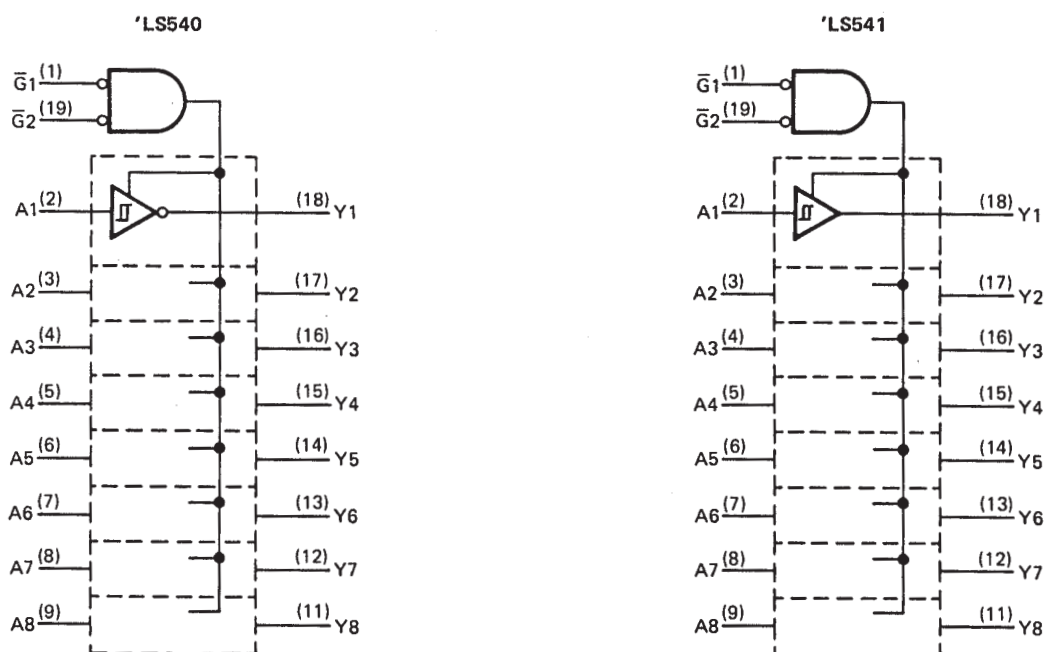
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#### logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### logic diagram (positive logic)



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

|                                                            |                 |
|------------------------------------------------------------|-----------------|
| Supply voltage, $V_{CC}$ (see Note 1)                      | 7 V             |
| Input voltage                                              | 7 V             |
| Operating free-air temperature range: SN54LS540, SN54LS541 | – 55°C to 125°C |
| SN74LS540, SN74LS541                                       | 0°C to 70°C     |
| Storage temperature range                                  | – 65°C to 150°C |

NOTE 1: Voltage values are with respect to the network ground terminal.



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# SN54LS540, SN54LS541, SN74LS540, SN74LS541

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

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#### recommended operating conditions

| PARAMETER                             | SN54LS' |     |     | SN74LS' |     |      | UNIT |
|---------------------------------------|---------|-----|-----|---------|-----|------|------|
|                                       | MIN     | NOM | MAX | MIN     | NOM | MAX  |      |
| Supply voltage, $V_{CC}$ (see Note 1) | 4.5     | 5   | 5.5 | 4.75    | 5   | 5.25 | V    |
| High-level output current, $I_{OH}$   |         |     | -12 |         |     | -15  | mA   |
| Low-level output current, $I_{OL}$    |         |     | 12  |         |     | 24   | mA   |
| Operating free-air temperature, $T_A$ | -55     |     | 125 | 0       |     | 70   | °C   |

NOTE 1: Voltage values are with respect to network ground terminal.

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

| PARAMETER                                       |                                                      | TEST CONDITIONS†                                                                                             |                         | SN54LS' |      | SN74LS' |      | UNIT |      |
|-------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------|---------|------|---------|------|------|------|
|                                                 |                                                      |                                                                                                              |                         | MIN     | TYP‡ | MAX     | MIN  |      | TYP‡ |
| V <sub>IH</sub>                                 | High-level input voltage                             |                                                                                                              |                         | 2       |      |         | 2    | V    |      |
| V <sub>IL</sub>                                 | Low-level input voltage                              |                                                                                                              |                         |         |      | 0.6     |      | 0.6  |      |
| V <sub>IK</sub>                                 | Input clamp voltage                                  | V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA                                                               |                         |         |      | -1.5    |      | -1.5 |      |
| Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> ) |                                                      | V <sub>CC</sub> = MIN                                                                                        |                         | 0.2     | 0.4  |         | 0.2  | 0.4  |      |
| V <sub>OH</sub>                                 | High-level output voltage                            | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max, I <sub>OH</sub> = -3 mA |                         | 2.4     | 3.4  |         | 2.4  | 3.4  |      |
|                                                 |                                                      | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2V, V <sub>IL</sub> = 0.5 V, I <sub>OH</sub> = MAX                  |                         | 2       |      |         | 2    |      |      |
| V <sub>OL</sub>                                 | Low-level output voltage                             | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max                          | I <sub>OL</sub> = 12 mA | 0.25    | 0.4  |         | 0.25 | 0.4  |      |
|                                                 |                                                      |                                                                                                              | I <sub>OL</sub> = 24 mA |         |      |         | 0.35 | 0.5  |      |
| I <sub>OZH</sub>                                | Off-state output current, high-level voltage applied | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> max                          | V <sub>O</sub> = 2.7 V  |         | 20   |         | 20   | μA   |      |
| I <sub>OZL</sub>                                | Off-state output current, low-level voltage applied  |                                                                                                              | V <sub>O</sub> = 0.4 V  |         | -20  |         | -20  |      |      |
| I <sub>I</sub>                                  | Input current at maximum input voltage               | V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V                                                                  |                         |         | 0.1  |         | 0.1  | mA   |      |
| I <sub>IH</sub>                                 | High-level input current, any input                  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V                                                                |                         |         | 20   |         | 20   | μA   |      |
| I <sub>IL</sub>                                 | Low-level input current                              | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V                                                                |                         |         | -0.2 |         | -0.2 | mA   |      |
| I <sub>OS</sub>                                 | Short-circuit output current <sup>§</sup>            | V <sub>CC</sub> = MAX                                                                                        |                         | -40     | -225 |         | -40  | -225 |      |
| I <sub>CC</sub>                                 | Outputs high                                         | V <sub>CC</sub> = MAX, Outputs open                                                                          | 'LS540                  | 13      | 25   |         | 13   | 25   | mA   |
|                                                 |                                                      |                                                                                                              | 'LS541                  | 18      | 32   |         | 18   | 32   |      |
|                                                 | Outputs low                                          |                                                                                                              | 'LS540                  | 24      | 45   |         | 24   | 45   |      |
|                                                 |                                                      |                                                                                                              | 'LS541                  | 30      | 52   |         | 30   | 52   |      |
|                                                 | All outputs disabled                                 |                                                                                                              | 'LS540                  | 30      | 52   |         | 30   | 52   |      |
|                                                 |                                                      |                                                                                                              | 'LS541                  | 32      | 55   |         | 32   | 55   |      |

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

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

§Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

# SN54LS540, SN54LS541, SN74LS540, SN74LS541

## OCTAL BUFFERS AND LINE DRIVERS

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switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER                                                  | TEST CONDITIONS                                            | 'LS540 |     |     | 'LS541 |     |     | UNIT |
|------------------------------------------------------------|------------------------------------------------------------|--------|-----|-----|--------|-----|-----|------|
|                                                            |                                                            | MIN    | TYP | MAX | MIN    | TYP | MAX |      |
| $t_{PLH}$ Propagation delay time, low-to-high-level output | $C_L = 45\text{ pF}$ , $R_L = 667\ \Omega$ ,<br>See Note 2 |        | 9   | 15  |        | 9   | 15  | ns   |
| $t_{PHL}$ Propagation delay time, high-to-low-level output |                                                            |        | 9   | 15  |        | 10  | 18  | ns   |
| $t_{PZL}$ Output enable time to low level                  |                                                            |        | 25  | 38  |        | 25  | 38  | ns   |
| $t_{PZH}$ Output enable time to high level                 |                                                            |        | 15  | 25  |        | 20  | 32  | ns   |
| $t_{PLZ}$ Output disable time from low level               | $C_L = 5\text{ pF}$ , $R_L = 667\ \Omega$ ,<br>See Note 2  |        | 10  | 18  |        | 10  | 18  | ns   |
| $t_{PHZ}$ Output disable time from high level              |                                                            |        | 15  | 25  |        | 18  | 29  | ns   |

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.



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**PACKAGING INFORMATION**

| Orderable part number            | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)           |
|----------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------------|
| <a href="#">84155012A</a>        | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 84155012A<br>SNJ54LS<br>540FK |
| <a href="#">8415501RA</a>        | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| <a href="#">8415501RA</a>        | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| <a href="#">8415601SA</a>        | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |
| <a href="#">8415601SA</a>        | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |
| <a href="#">JM38510/32404B2A</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A          |
| <a href="#">JM38510/32404B2A</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A          |
| JM38510/32404B2A.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A          |
| JM38510/32404B2A.A               | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A          |
| <a href="#">JM38510/32404BRA</a> | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA          |
| <a href="#">JM38510/32404BRA</a> | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA          |
| JM38510/32404BRA.A               | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA          |
| JM38510/32404BRA.A               | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA          |
| <a href="#">JM38510/32405BRA</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA          |
| <a href="#">JM38510/32405BRA</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA          |
| JM38510/32405BRA.A               | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA          |

| Orderable part number           | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)  |
|---------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|----------------------|
| JM38510/32405BRA.A              | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA |
| <a href="#">M38510/32404B2A</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A |
| <a href="#">M38510/32404B2A</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404B2A |
| <a href="#">M38510/32404BRA</a> | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA |
| <a href="#">M38510/32404BRA</a> | NRND          | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32404BRA |
| <a href="#">M38510/32405BRA</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA |
| <a href="#">M38510/32405BRA</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | JM38510/<br>32405BRA |
| <a href="#">SN54LS540J</a>      | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS540J           |
| <a href="#">SN54LS540J</a>      | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS540J           |
| SN54LS540J.A                    | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS540J           |
| SN54LS540J.A                    | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS540J           |
| <a href="#">SN54LS541J</a>      | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS541J           |
| <a href="#">SN54LS541J</a>      | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS541J           |
| SN54LS541J.A                    | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS541J           |
| SN54LS541J.A                    | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SN54LS541J           |
| <a href="#">SN74LS540DBR</a>    | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| <a href="#">SN74LS540DBR</a>    | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| SN74LS540DBR.A                  | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| SN74LS540DBR.A                  | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| <a href="#">SN74LS540DWR</a>    | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| <a href="#">SN74LS540DWR</a>    | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| SN74LS540DWR.A                  | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| SN74LS540DWR.A                  | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS540                |
| <a href="#">SN74LS540N</a>      | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS540N           |
| <a href="#">SN74LS540N</a>      | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS540N           |

| Orderable part number        | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)           |
|------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------------|
| SN74LS540N.A                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS540N                    |
| SN74LS540N.A                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS540N                    |
| <a href="#">SN74LS540NSR</a> | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS540                       |
| <a href="#">SN74LS540NSR</a> | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS540                       |
| SN74LS540NSR.A               | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS540                       |
| SN74LS540NSR.A               | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS540                       |
| SN74LS541DBR.A               | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| SN74LS541DBR.A               | Active        | Production           | SSOP (DB)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| <a href="#">SN74LS541DW</a>  | Active        | Production           | SOIC (DW)   20 | 25   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| <a href="#">SN74LS541DW</a>  | Active        | Production           | SOIC (DW)   20 | 25   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| SN74LS541DW.A                | Active        | Production           | SOIC (DW)   20 | 25   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| SN74LS541DW.A                | Active        | Production           | SOIC (DW)   20 | 25   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| <a href="#">SN74LS541DWR</a> | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| <a href="#">SN74LS541DWR</a> | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| SN74LS541DWR.A               | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| SN74LS541DWR.A               | Active        | Production           | SOIC (DW)   20 | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | LS541                         |
| <a href="#">SN74LS541N</a>   | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| <a href="#">SN74LS541N</a>   | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| SN74LS541N.A                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| SN74LS541N.A                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| SN74LS541NE4                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| SN74LS541NE4                 | Active        | Production           | PDIP (N)   20  | 20   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | SN74LS541N                    |
| <a href="#">SN74LS541NSR</a> | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS541                       |
| <a href="#">SN74LS541NSR</a> | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS541                       |
| SN74LS541NSR.A               | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS541                       |
| SN74LS541NSR.A               | Active        | Production           | SOP (NS)   20  | 2000   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 74LS541                       |
| <a href="#">SNJ54LS540FK</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 84155012A<br>SNJ54LS<br>540FK |
| <a href="#">SNJ54LS540FK</a> | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 84155012A<br>SNJ54LS<br>540FK |

| Orderable part number       | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6)           |
|-----------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|-------------------------------|
| SNJ54LS540FK.A              | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 84155012A<br>SNJ54LS<br>540FK |
| SNJ54LS540FK.A              | Active        | Production           | LCCC (FK)   20 | 55   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 84155012A<br>SNJ54LS<br>540FK |
| <a href="#">SNJ54LS540J</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| <a href="#">SNJ54LS540J</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| SNJ54LS540J.A               | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| SNJ54LS540J.A               | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415501RA<br>SNJ54LS540J      |
| <a href="#">SNJ54LS541J</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS541J                   |
| <a href="#">SNJ54LS541J</a> | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS541J                   |
| SNJ54LS541J.A               | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS541J                   |
| SNJ54LS541J.A               | Active        | Production           | CDIP (J)   20  | 20   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | SNJ54LS541J                   |
| <a href="#">SNJ54LS541W</a> | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |
| <a href="#">SNJ54LS541W</a> | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |
| SNJ54LS541W.A               | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |
| SNJ54LS541W.A               | Active        | Production           | CFP (W)   20   | 25   TUBE             | No          | SNPB                                 | N/A for Pkg Type                  | -55 to 125   | 8415601SA<br>SNJ54LS541W      |

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

<sup>(2)</sup> **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.

<sup>(3)</sup> **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.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54LS540, SN54LS541, SN74LS540, SN74LS541 :**

- Catalog : [SN74LS540](#), [SN74LS541](#)
- Military : [SN54LS540](#), [SN54LS541](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

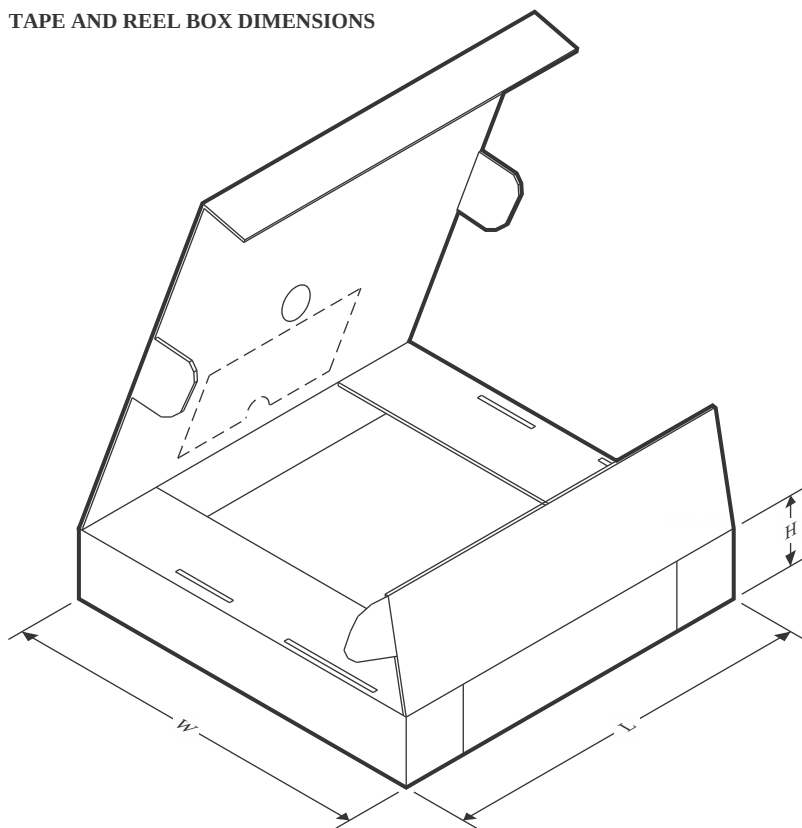
## TAPE AND REEL INFORMATION



\*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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LS540DBR | SSOP         | DB              | 20   | 2000 | 330.0              | 16.4               | 8.2     | 7.5     | 2.5     | 12.0    | 16.0   | Q1            |
| SN74LS540DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.9    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS540DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS540NSR | SOP          | NS              | 20   | 2000 | 330.0              | 24.4               | 8.4     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS541DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS541NSR | SOP          | NS              | 20   | 2000 | 330.0              | 24.4               | 8.4     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |

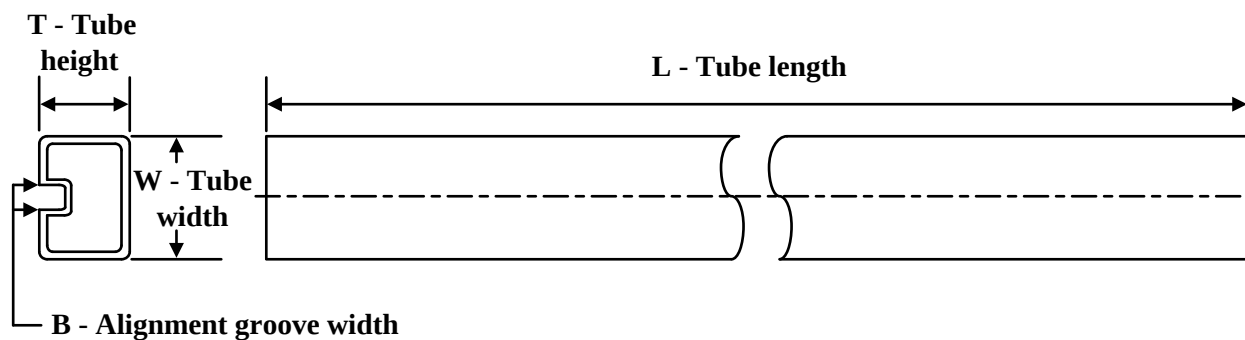
## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LS540DBR | SSOP         | DB              | 20   | 2000 | 353.0       | 353.0      | 32.0        |
| SN74LS540DWR | SOIC         | DW              | 20   | 2000 | 356.0       | 356.0      | 45.0        |
| SN74LS540DWR | SOIC         | DW              | 20   | 2000 | 356.0       | 356.0      | 45.0        |
| SN74LS540NSR | SOP          | NS              | 20   | 2000 | 356.0       | 356.0      | 45.0        |
| SN74LS541DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS541NSR | SOP          | NS              | 20   | 2000 | 356.0       | 356.0      | 45.0        |

## TUBE

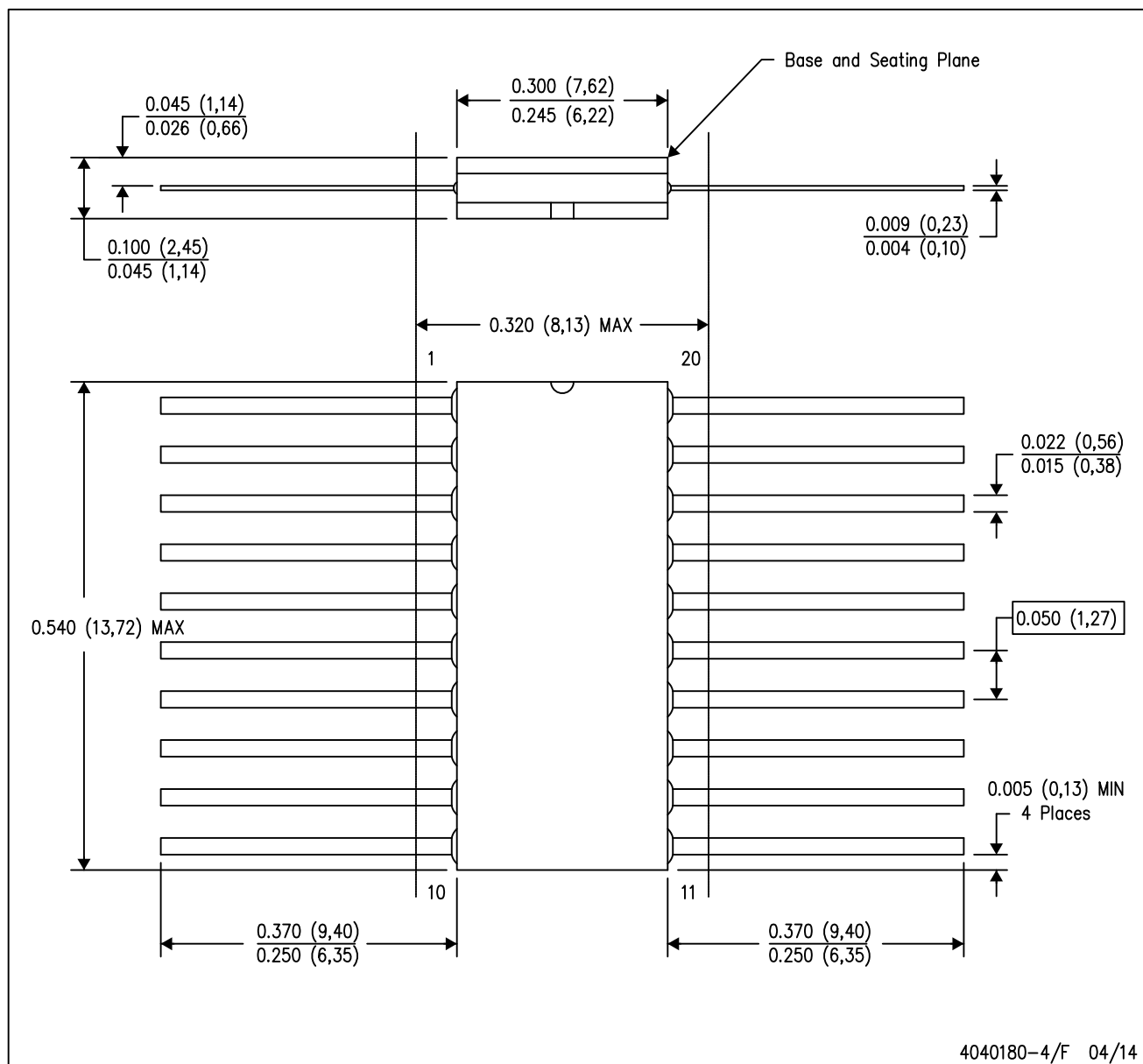


\*All dimensions are nominal

| Device             | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|--------------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 84155012A          | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| 8415601SA          | W            | CFP          | 20   | 25  | 506.98 | 26.16  | 6220   | NA     |
| JM38510/32404B2A   | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| JM38510/32404B2A.A | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| M38510/32404B2A    | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SN74LS540N         | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS540N.A       | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS541DW        | DW           | SOIC         | 20   | 25  | 507    | 12.83  | 5080   | 6.6    |
| SN74LS541DW.A      | DW           | SOIC         | 20   | 25  | 507    | 12.83  | 5080   | 6.6    |
| SN74LS541N         | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS541N.A       | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SN74LS541NE4       | N            | PDIP         | 20   | 20  | 506    | 13.97  | 11230  | 4.32   |
| SNJ54LS540FK       | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54LS540FK.A     | FK           | LCCC         | 20   | 55  | 506.98 | 12.06  | 2030   | NA     |
| SNJ54LS541W        | W            | CFP          | 20   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SNJ54LS541W.A      | W            | CFP          | 20   | 25  | 506.98 | 26.16  | 6220   | NA     |

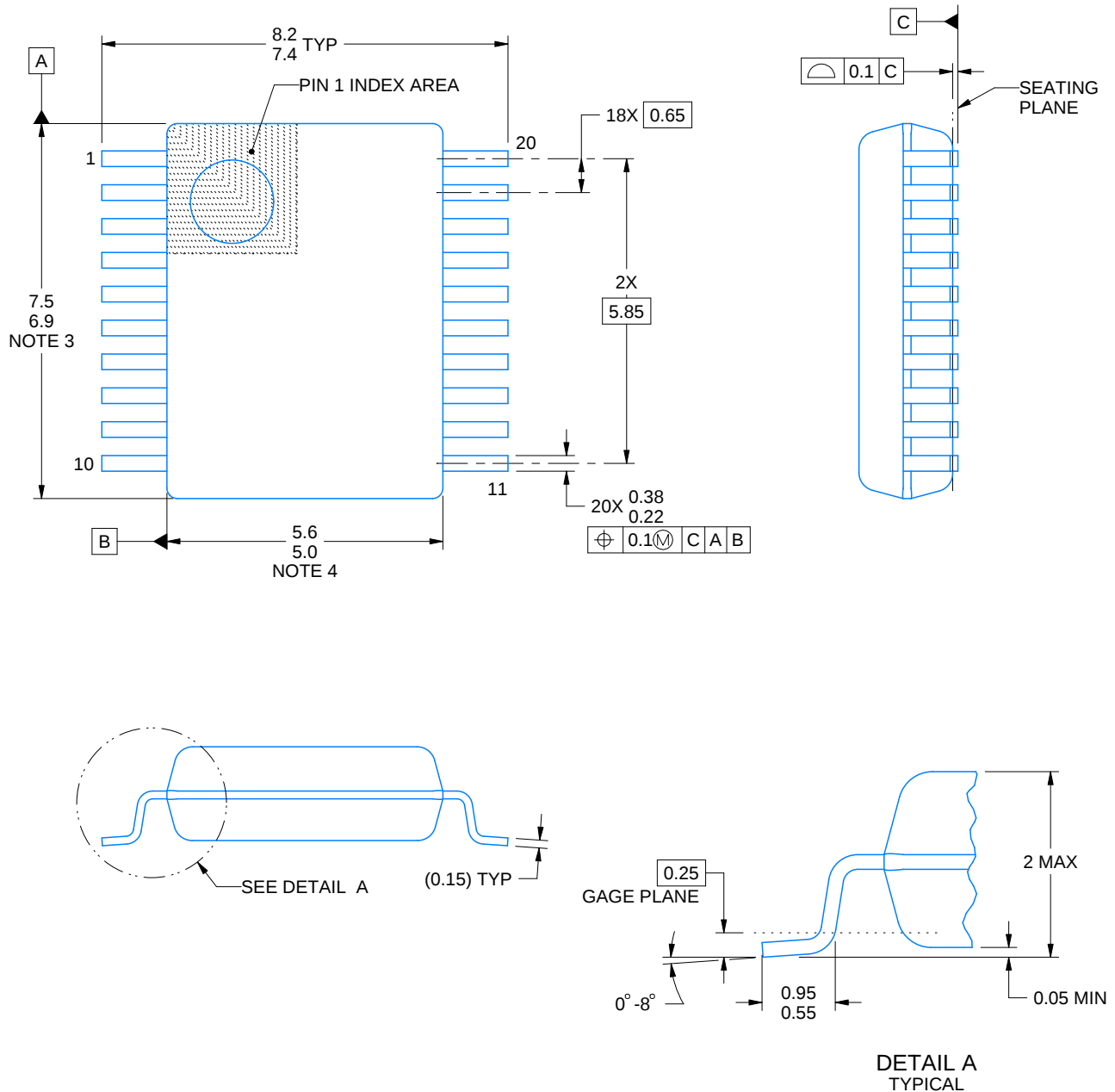
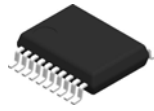
W (R-GDFP-F20)

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 GDP2-F20



4214851/B 08/2019

## NOTES:

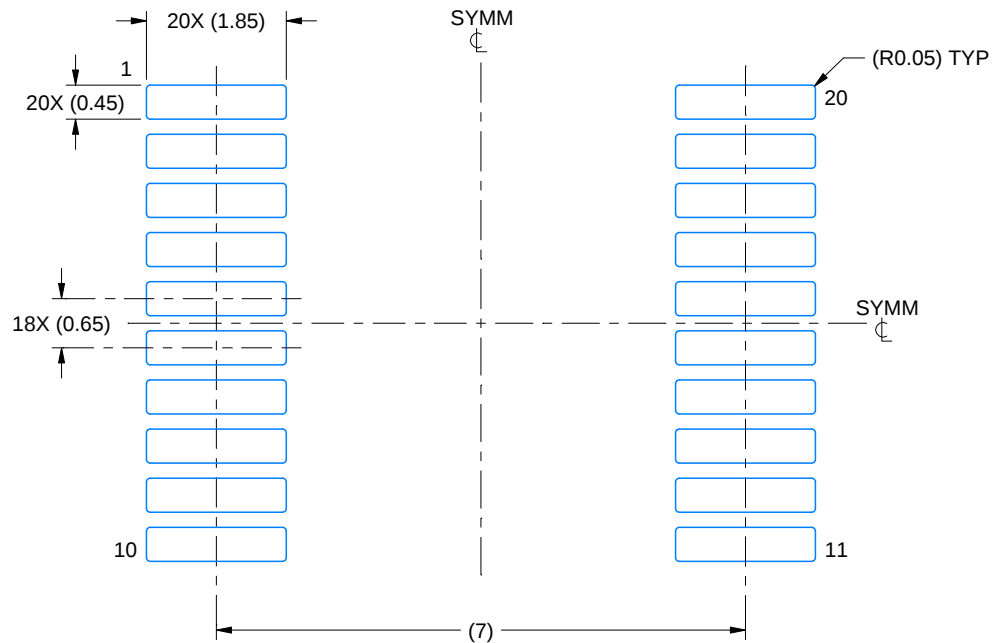
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

# EXAMPLE BOARD LAYOUT

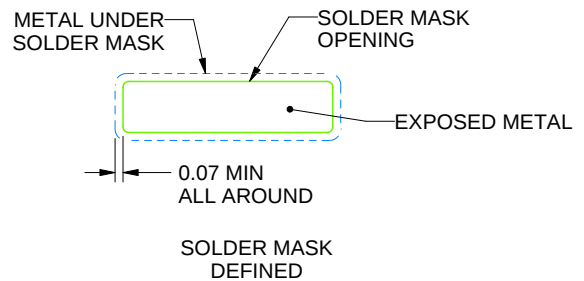
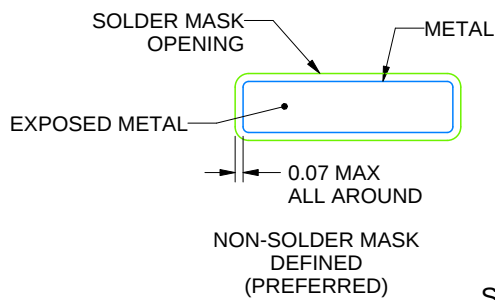
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4214851/B 08/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

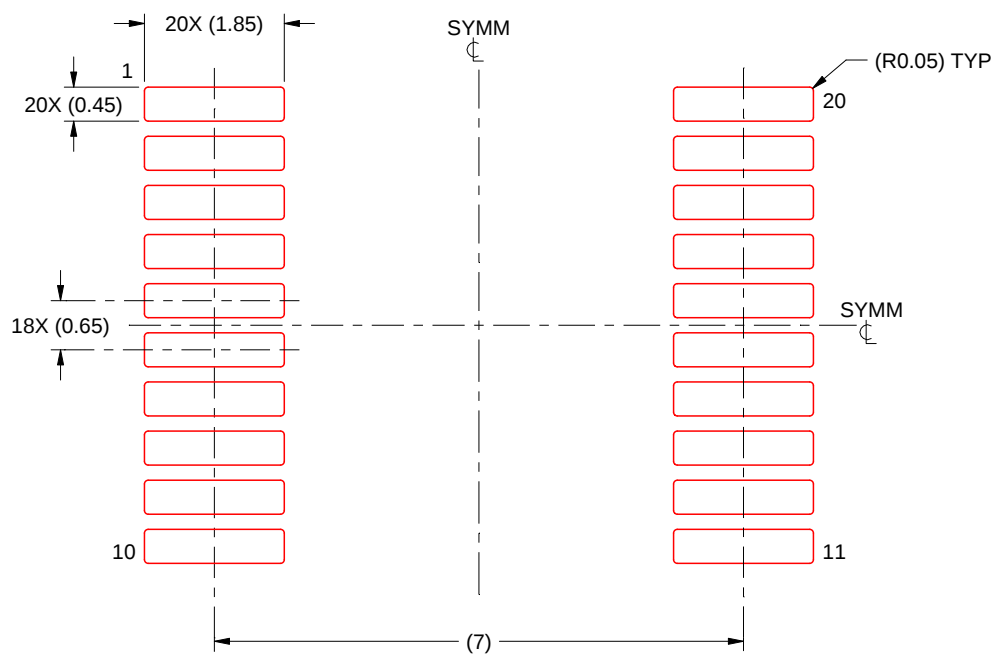
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4214851/B 08/2019

NOTES: (continued)

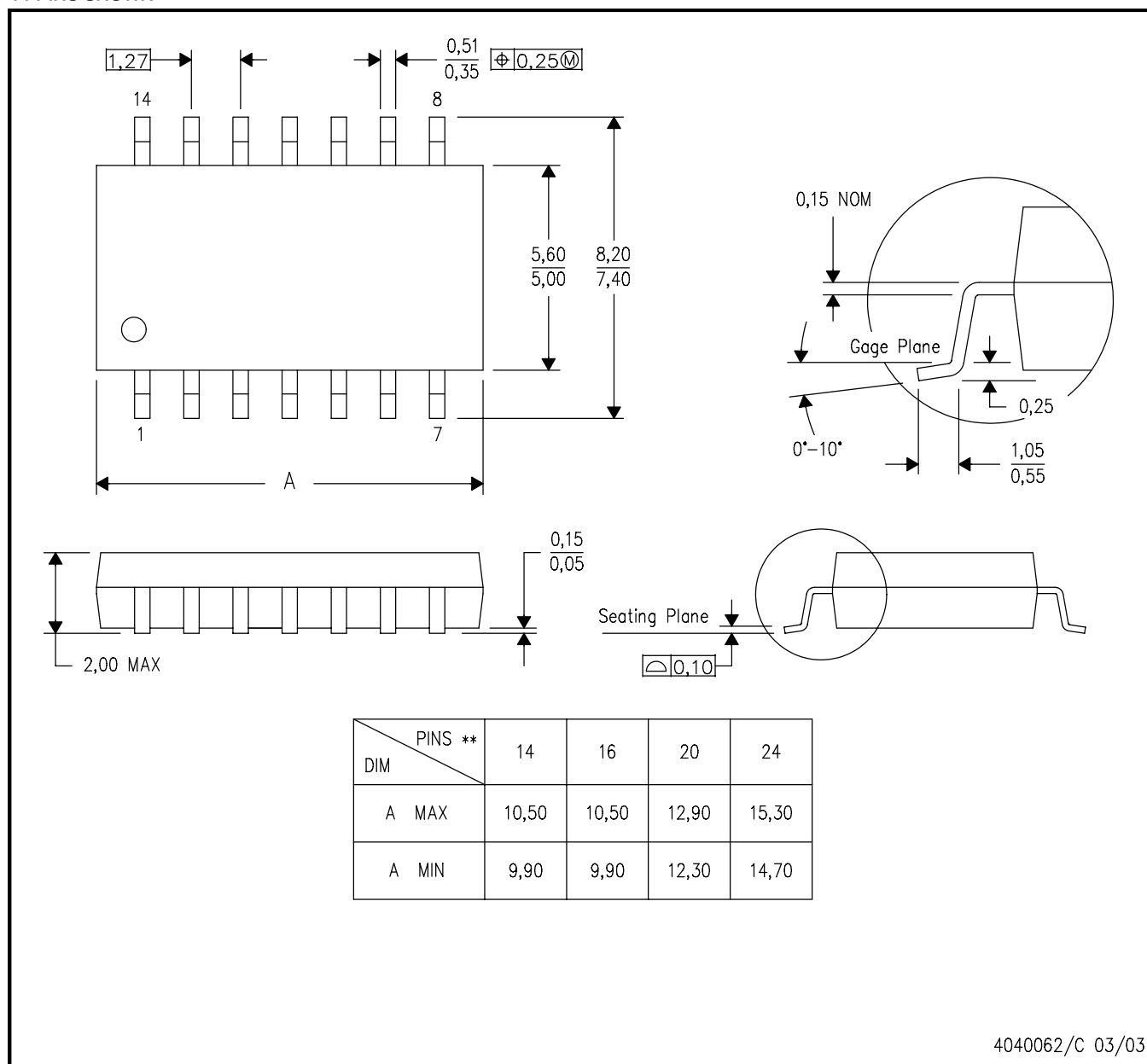
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# 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.

## GENERIC PACKAGE VIEW

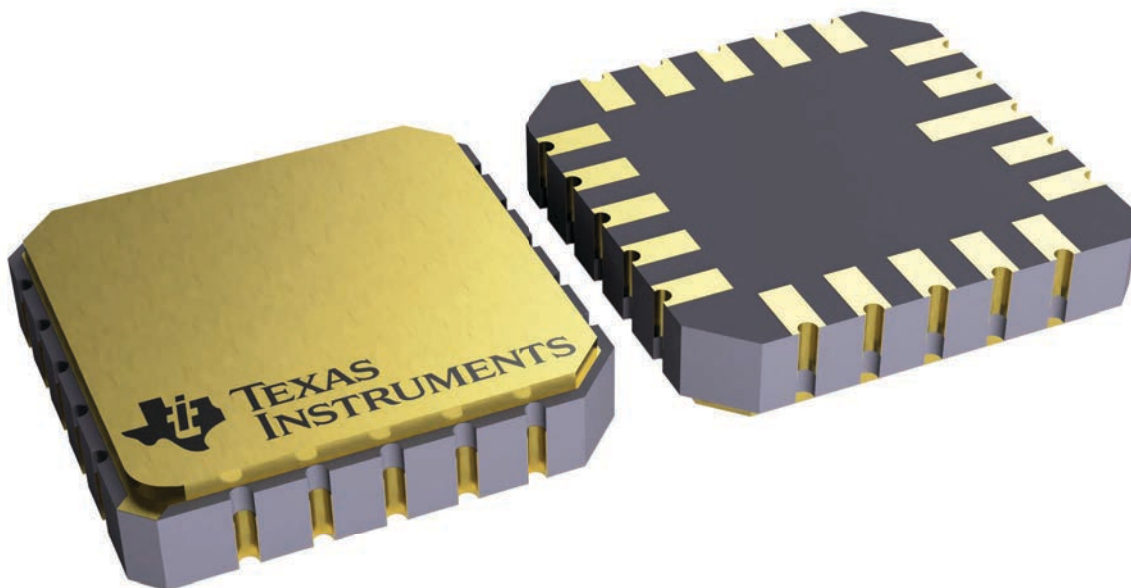
**FK 20**

**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.

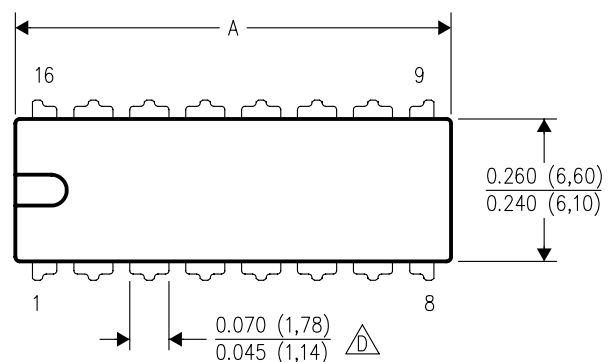


4229370VA\

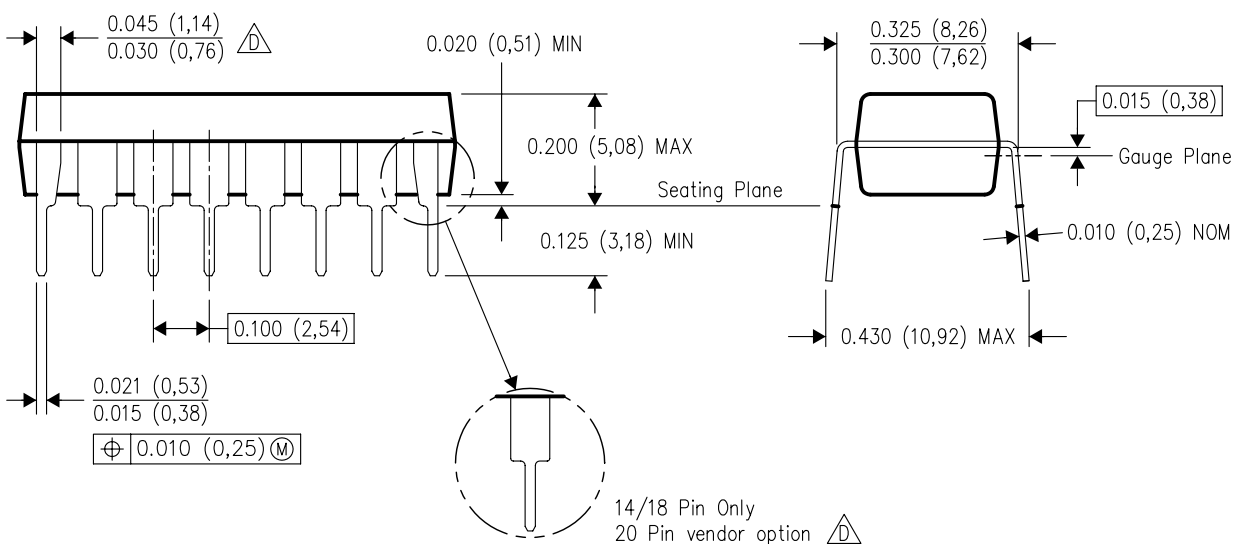
N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



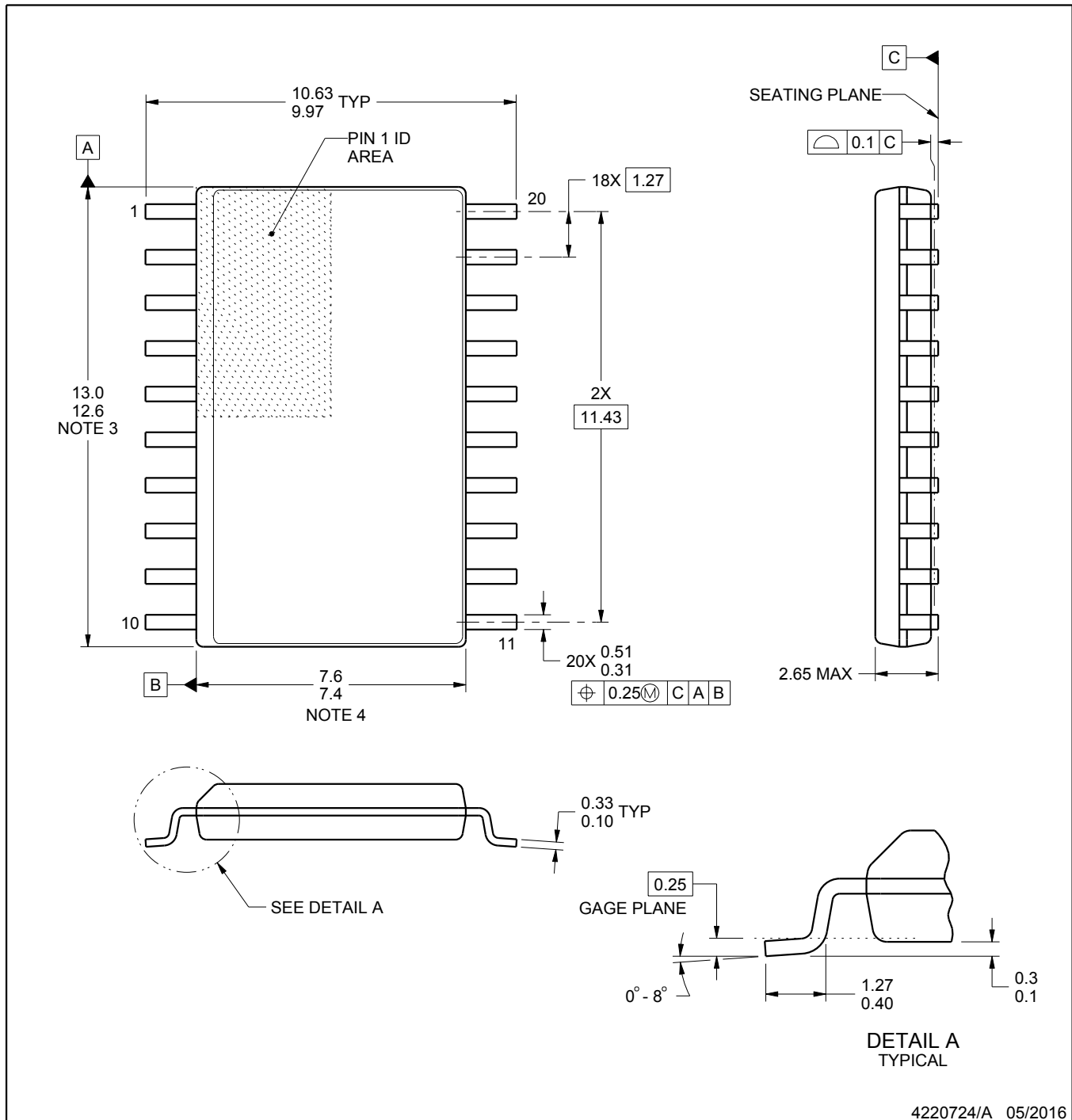
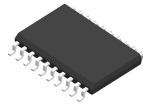
| PINS **<br>DIM      | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
|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



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.



4220724/A 05/2016

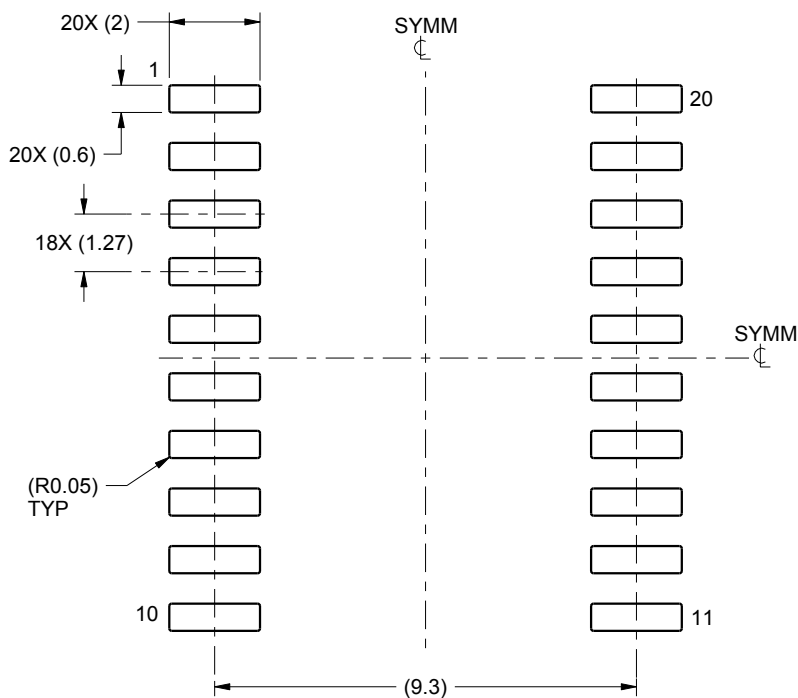
## NOTES:

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-013.

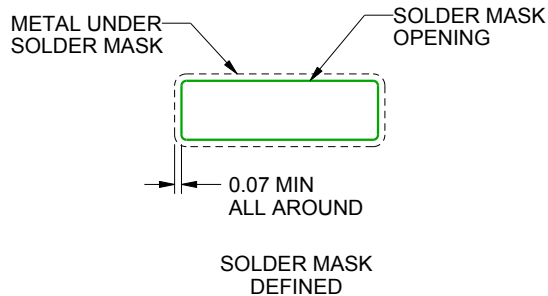
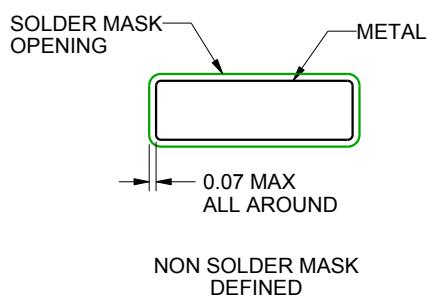
**DW0020A**

### SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



## SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

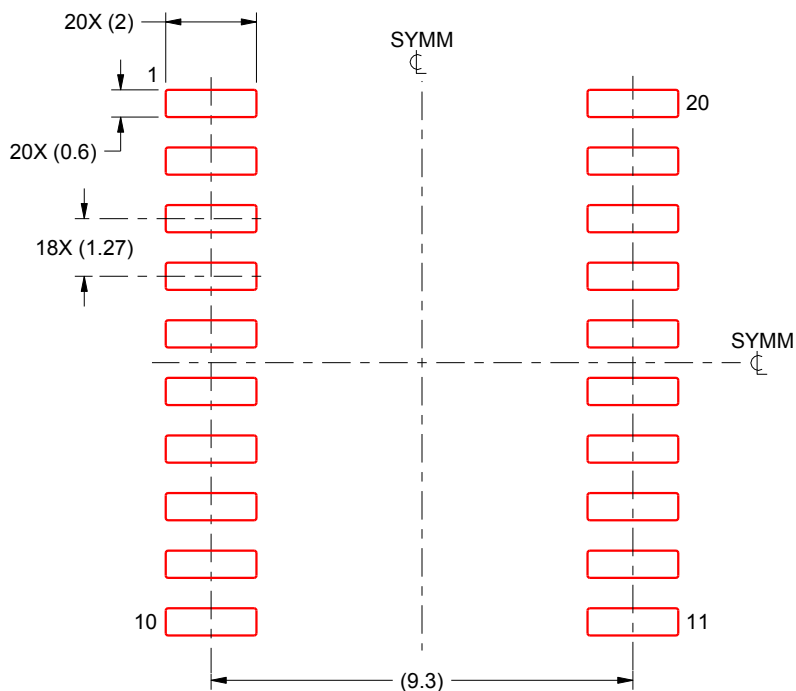
6. Publication IPC-7351 may have alternate designs.  
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

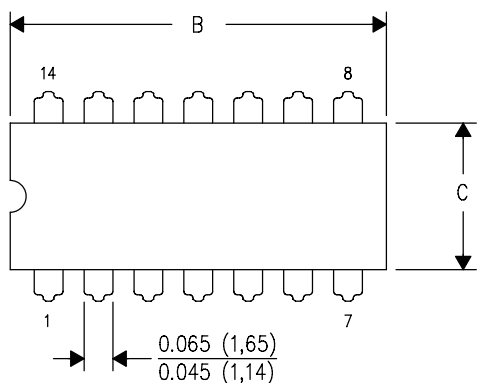
NOTES: (continued)

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.

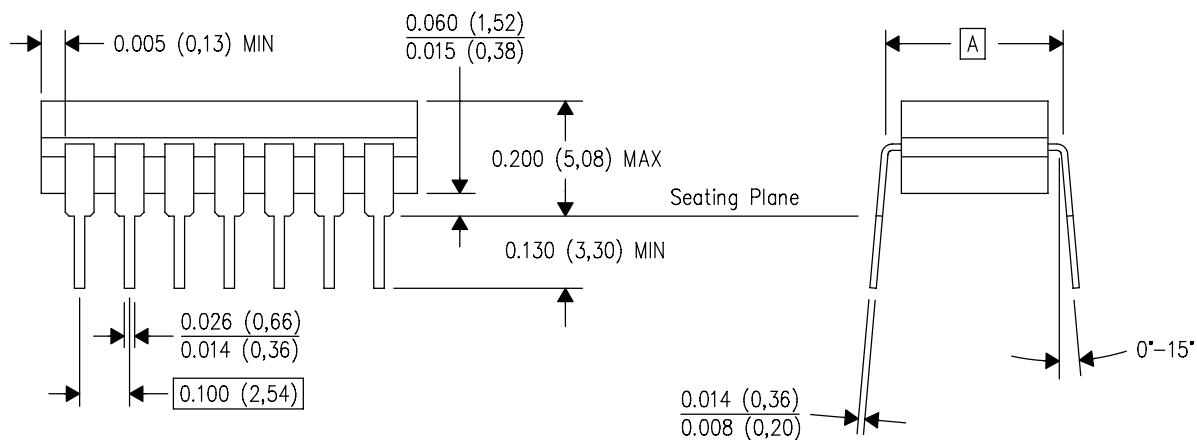
J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



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

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Last updated 10/2025