

# SN54LS640 THRU SN54LS642, SN54LS644, SN54LS645 SN74LS640 THRU SN74LS642, SN74LS644, SN74LS645 OCTAL BUS TRANSCEIVERS

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- **SN74LS64X-1 Versions Rated at  $I_{OL}$  of 48 mA**
- **Bi-directional Bus Transceivers in High-Density 20-Pin Packages**
- **Hysteresis at Bus Inputs Improves Noise Margins**
- **Choice of True or Inverting Logic**
- **Choice of 3-State or Open-Collector Outputs**

| DEVICE | OUTPUT         | LOGIC              |
|--------|----------------|--------------------|
| 'LS640 | 3-State        | Inverting          |
| 'LS641 | Open-Collector | True               |
| 'LS642 | Open-Collector | Inverting          |
| 'LS644 | Open-Collector | True and inverting |
| 'LS645 | 3-State        | True               |

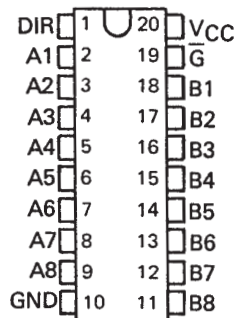
## description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction control (DIR) input. The enable input ( $\bar{G}$ ) can be used to disable the device so the buses are effectively isolated.

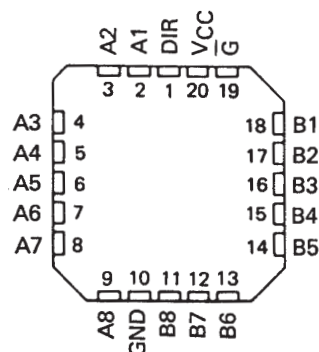
The -1 versions of the SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are identical to the standard versions except that the recommended maximum  $I_{OL}$  is increased to 48 milliamperes. There are no -1 versions of the SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645.

The SN54LS640 thru SN54LS642, SN54LS644, and SN54LS645 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74LS640 thru SN74LS642, SN74LS644, and SN74LS645 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54LS' . . . J PACKAGE  
SN74LS' . . . DW OR N PACKAGE  
(TOP VIEW)



SN54LS' . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE

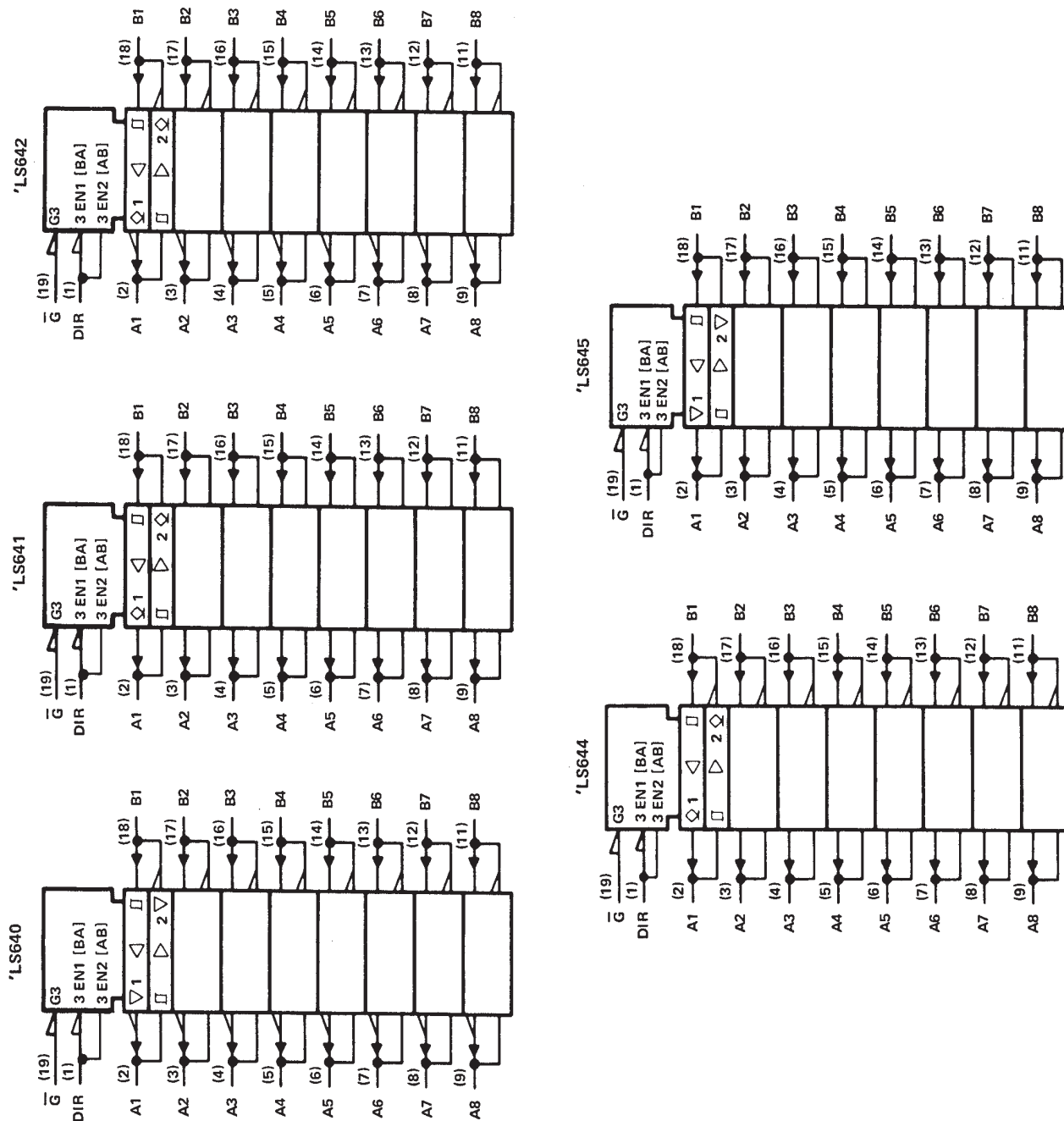
| CONTROL INPUTS |     | OPERATION        |                  |                         |
|----------------|-----|------------------|------------------|-------------------------|
| $\bar{G}$      | DIR | 'LS640<br>'LS642 | 'LS641<br>'LS645 | 'LS644                  |
| L              | L   | B data to A bus  | B data to A bus  | B data to A bus         |
| L              | H   | A data to B bus  | A data to B bus  | $\bar{A}$ data to B bus |
| H              | X   | Isolation        | Isolation        | Isolation               |

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

# SN54LS640 THRU SN54LS642, SN54LS644, SN54LS645 SN74LS640 THRU SN74LS642, SN74LS644, SN74LS645 OCTAL BUS TRANSCEIVERS

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logic symbols†

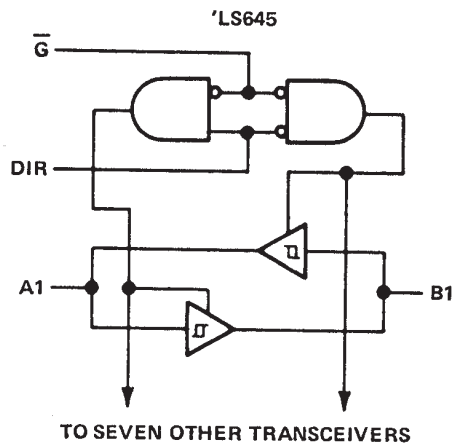
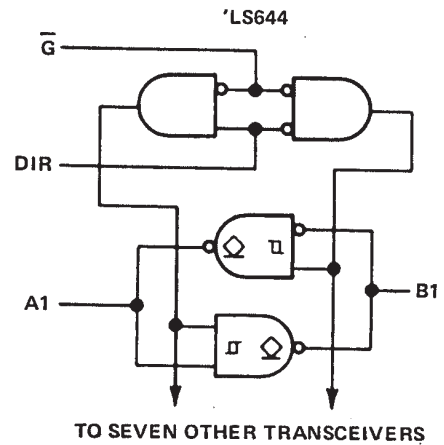
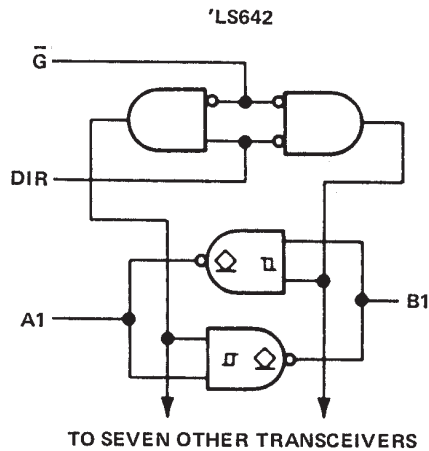
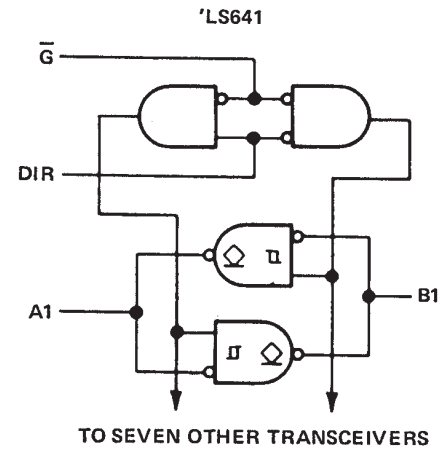
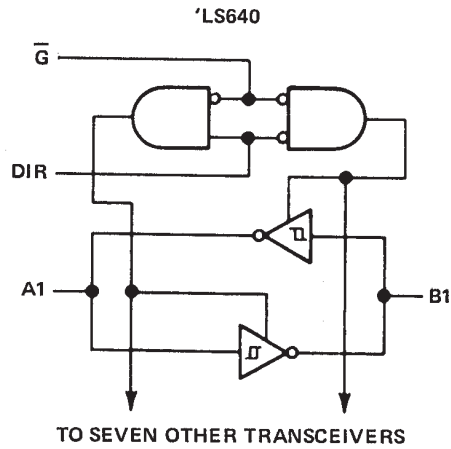


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for DW, J, and N packages.

SN54LS640 THRU SN54LS642, SN54LS644, SN54LS645  
 SN74LS640 THRU SN74LS642, SN74LS644, SN74LS645  
 OCTAL BUS TRANSCEIVERS

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logic diagrams (positive logic)



**SN54LS640, SN54LS645**  
**SN74LS640, SN74LS645**  
**OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS**

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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: All inputs . . . . .                                  | 7 V               |
| I/O ports . . . . .                                                  | 5.5 V             |
| Operating free-air temperature range: SN54LS640, SN54LS645 . . . . . | – 55 °C to 125 °C |
| SN74LS640, SN74LS645 . . . . .                                       | 0 °C to 70 °C     |
| Storage temperature range . . . . .                                  | – 65 °C to 150 °C |

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

**recommended operating conditions**

| PARAMETER                            | SN54LS640<br>SN54LS645 |     |      | SN74LS640<br>SN74LS645 |     |      | 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     |                        |     | 0.5  |                        |     | 0.6  | V    |
| $I_{OH}$ High-level output current   |                        |     | – 12 |                        |     | – 15 | mA   |
| $I_{OL}$ Low-level output current    |                        |     | 12   |                        |     | 24   | mA   |
|                                      |                        |     |      |                        |     | 48†  |      |
| $T_A$ Operating free-air temperature | – 55                   |     | 125  | 0                      |     | 70   | °C   |

†The 48-mA limit applies for the SN74LS640-1 and SN74LS645-1 only.

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

| PARAMETER                                          |                  | TEST CONDITIONS†                                                       |                           | SN54LS640<br>SN54LS645 |       | SN74LS640<br>SN74LS645 |       | UNIT |
|----------------------------------------------------|------------------|------------------------------------------------------------------------|---------------------------|------------------------|-------|------------------------|-------|------|
|                                                    |                  |                                                                        |                           | MIN                    | TYP‡  | MAX                    | MIN   |      |
| V <sub>IK</sub>                                    |                  | V <sub>CC</sub> = MIN, I <sub>I</sub> = – 18 mA                        |                           |                        |       | – 1.5                  |       | V    |
| Hysteresis<br>(V <sub>T+</sub> – V <sub>T–</sub> ) |                  | V <sub>CC</sub> = MIN,                                                 | A or B input              | 0.1                    | 0.4   | 0.2                    | 0.4   | V    |
| V <sub>OH</sub>                                    |                  | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V,<br>V <sub>IL</sub> = MAX | I <sub>OH</sub> = – 3 mA  | 2.4                    | 3.4   | 2.4                    | 3.4   |      |
|                                                    |                  |                                                                        | I <sub>OH</sub> = MAX     | 2                      |       | 2                      |       |      |
| V <sub>OL</sub>                                    |                  | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V,<br>V <sub>IL</sub> = MAX | I <sub>OL</sub> = 12 mA   | 0.25                   | 0.4   | 0.25                   | 0.4   | V    |
|                                                    |                  |                                                                        | I <sub>OL</sub> = 24 mA   |                        |       | 0.35                   | 0.5   |      |
|                                                    |                  |                                                                        | I <sub>OL</sub> = 48 mA # |                        |       | 0.4                    | 0.5   |      |
| I <sub>OZH</sub>                                   |                  | V <sub>CC</sub> = MAX, $\bar{G}$ at 2 V, V <sub>O</sub> = 2.7 V        |                           | 20                     |       | 20                     |       | μA   |
| I <sub>OZL</sub>                                   |                  | V <sub>CC</sub> = MAX, $\bar{G}$ at 2 V, V <sub>O</sub> = 0.4 V        |                           | – 0.4                  |       | – 0.4                  |       | mA   |
| I <sub>I</sub>                                     | A or B           | V <sub>CC</sub> = MAX                                                  | V <sub>I</sub> = 5.5 V    | 0.1                    |       | 0.1                    |       | mA   |
|                                                    | DIR or $\bar{G}$ |                                                                        | V <sub>I</sub> = 7 V      | 0.1                    |       | 0.1                    |       |      |
| I <sub>IH</sub>                                    |                  | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2.7 V                         |                           | 20                     |       | 20                     |       | μA   |
| I <sub>IL</sub>                                    |                  | V <sub>CC</sub> = MAX, V <sub>IL</sub> = 0.4 V                         |                           | – 0.4                  |       | – 0.4                  |       | mA   |
| I <sub>OS</sub> †                                  |                  | V <sub>CC</sub> = MAX                                                  |                           | – 40                   | – 225 | – 40                   | – 225 | mA   |
| I <sub>CC</sub>                                    | Outputs high     | V <sub>CC</sub> = MAX, Outputs open                                    |                           | 48                     | 70    | 48                     | 70    | mA   |
|                                                    | Outputs low      |                                                                        |                           | 62                     | 90    | 62                     | 90    |      |
|                                                    | Outputs at Hi-Z  |                                                                        |                           | 64                     | 95    | 64                     | 95    |      |

†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.

‡The 48-mA condition applies for the SN74LS640-1 and SN74LS645-1 only.

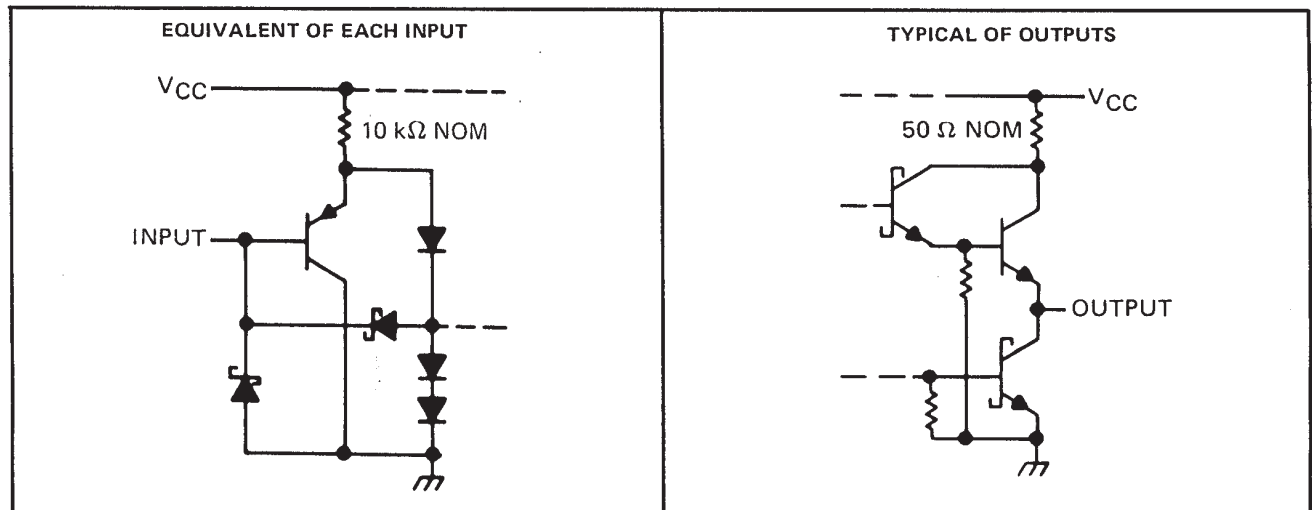


switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER                                                     | FROM<br>(INPUT) | TO<br>(OUTPUT) | TEST<br>CONDITIONS                                            | 'LS640, 'LS640-1 |     |     | 'LS645, 'LS645-1 |     |     | UNIT |
|---------------------------------------------------------------|-----------------|----------------|---------------------------------------------------------------|------------------|-----|-----|------------------|-----|-----|------|
|                                                               |                 |                |                                                               | MIN              | TYP | MAX | MIN              | TYP | MAX |      |
| $t_{PLH}$ Propagation delay time,<br>low-to-high-level output | A               | B              | $C_L = 45\text{ pF}$ ,<br>$R_L = 667\ \Omega$ ,<br>See Note 2 |                  | 6   | 10  |                  | 8   | 15  | ns   |
|                                                               | B               | A              |                                                               |                  | 6   | 10  |                  | 8   | 15  |      |
| $t_{PHL}$ Propagation delay time,<br>high-to-low-level output | A               | B              |                                                               |                  | 8   | 15  |                  | 11  | 15  | ns   |
|                                                               | B               | A              |                                                               |                  | 8   | 15  |                  | 11  | 15  |      |
| $t_{PZL}$ Output enable time to<br>low level                  | $\overline{G}$  | A              |                                                               |                  | 31  | 40  |                  | 31  | 40  | ns   |
|                                                               | $\overline{G}$  | B              |                                                               |                  | 31  | 40  |                  | 31  | 40  |      |
| $t_{PZH}$ Output enable time to<br>high level                 | $\overline{G}$  | A              |                                                               |                  | 23  | 40  |                  | 26  | 40  | ns   |
|                                                               | $\overline{G}$  | B              |                                                               |                  | 23  | 40  |                  | 26  | 40  |      |
| $t_{PLZ}$ Output disable time<br>from low level               | $\overline{G}$  | A              | $C_L = 5\text{ pF}$ ,<br>$R_L = 667\ \Omega$ ,<br>See Note 2  |                  | 15  | 25  |                  | 15  | 25  | ns   |
|                                                               | $\overline{G}$  | B              |                                                               |                  | 15  | 25  |                  | 15  | 25  |      |
| $t_{PHZ}$ Output disable time<br>from high level              | $\overline{G}$  | A              |                                                               |                  | 15  | 25  |                  | 15  | 25  | ns   |
|                                                               | $\overline{G}$  | B              |                                                               |                  | 15  | 25  |                  | 15  | 25  |      |

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

### schematics of inputs and outputs

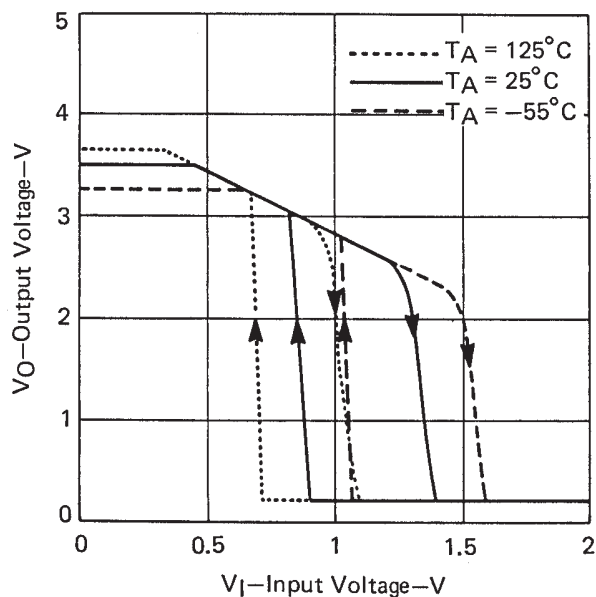


**SN54LS640, SN54LS645**  
**SN74LS640, SN74LS645**  
**OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS**

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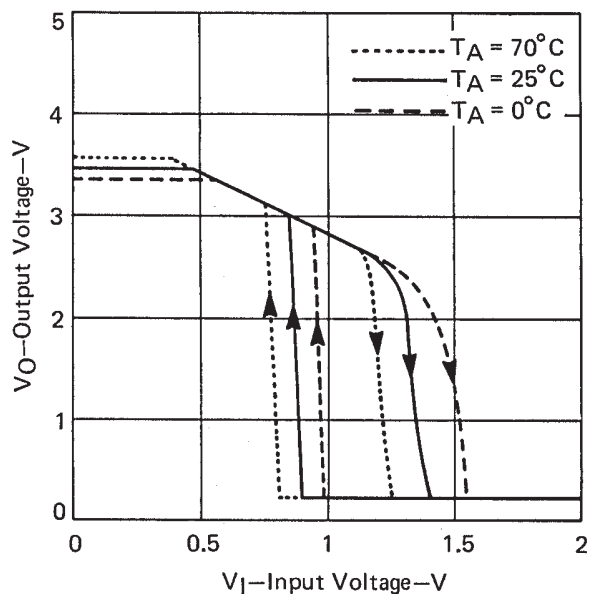
**TYPICAL CHARACTERISTICS**

**SN54LS'**  
**INVERTING OUTPUT VOLTAGE**  
 vs  
**INPUT VOLTAGE**



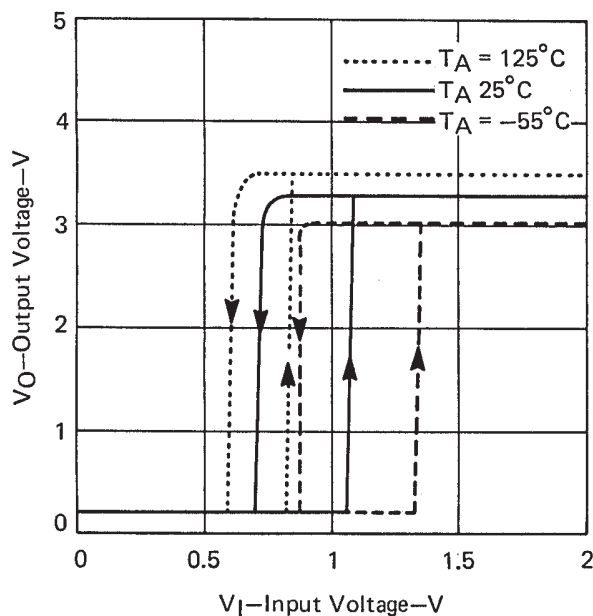
**FIGURE 1**

**SN74LS'**  
**INVERTING OUTPUT VOLTAGE**  
 vs  
**INPUT VOLTAGE**



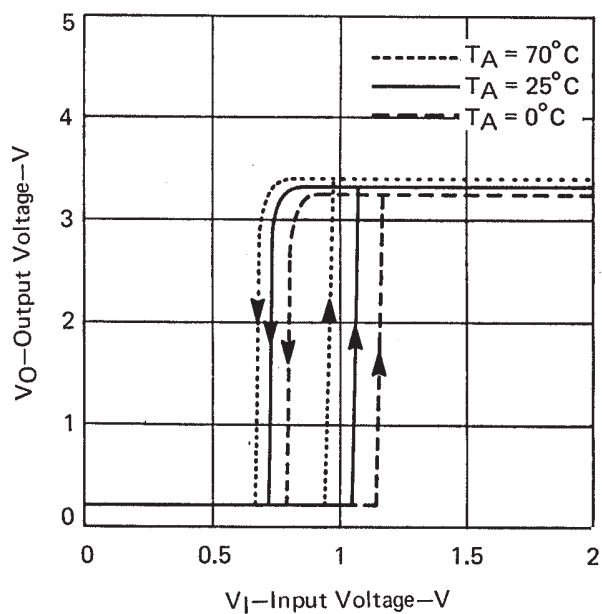
**FIGURE 2**

**SN54LS'**  
**NONINVERTING OUTPUT VOLTAGE**  
 vs  
**INPUT VOLTAGE**



**FIGURE 3**

**SN74LS'**  
**NONINVERTING OUTPUT VOLTAGE**  
 vs  
**INPUT VOLTAGE**



**FIGURE 4**

SN54LS641, SN54LS642, SN54LS644  
SN74LS641, SN74LS642, SN74LS644  
**OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS**

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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: All inputs and I/O ports                               | 7 V             |
| Operating free-air temperature range: SN54LS641, SN54LS642, SN54LS644 | – 55°C to 125°C |
| SN74LS641, SN74LS642, SN74LS644                                       | 0°C to 70°C     |
| Storage temperature range                                             | – 65°C to 150°C |

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

**recommended operating conditions**

| PARAMETER                            | SN54LS641<br>SN54LS642<br>SN54LS644 |     |     | SN74LS641<br>SN74LS642<br>SN74LS644 |     |                 | 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     |                                     |     | 0.5 |                                     |     | 0.6             | V    |
| $V_{OH}$ High-level output voltage   |                                     |     | 5.5 |                                     |     | 5.5             | V    |
| $I_{OL}$ Low-level output current    |                                     |     | 12  |                                     |     | 24              | mA   |
|                                      |                                     |     |     |                                     |     | 48 <sup>§</sup> |      |
| $T_A$ Operating free-air temperature | – 55                                |     | 125 | 0                                   |     | 70              | °C   |

<sup>§</sup>The 48 mA limit applies for the SN74LS641-1, SN74LS642-1, and SN74LS644-1 only.

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

| PARAMETER                           |                  | TEST CONDITIONS <sup>†</sup>                                                             | SN54LS641<br>SN54LS642<br>SN54LS644 |                       |       | SN74LS641<br>SN74LS642<br>SN74LS644 |                       |       | UNIT |
|-------------------------------------|------------------|------------------------------------------------------------------------------------------|-------------------------------------|-----------------------|-------|-------------------------------------|-----------------------|-------|------|
|                                     |                  |                                                                                          | MIN                                 | TYP <sup>‡</sup>      | MAX   | MIN                                 | TYP <sup>‡</sup>      | MAX   |      |
| $V_{IK}$                            |                  | $V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$                                              |                                     |                       | – 1.5 |                                     |                       | – 1.5 | V    |
| Hysteresis<br>( $V_{T+} - V_{T-}$ ) |                  | $V_{CC} = \text{MIN}, A \text{ or } B \text{ input}$                                     | 0.1                                 | 0.4                   |       | 0.2                                 | 0.4                   |       | V    |
| $I_{OH}$                            |                  | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}, V_{OH} = 5.5 \text{ V}$ |                                     | 0.1                   |       |                                     | 0.1                   |       | mA   |
| $V_{OL}$                            |                  | $V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}, I_{OL} = 12 \text{ mA}$ | 0.25                                | 0.4                   |       | 0.25                                | 0.4                   |       | V    |
|                                     |                  | $I_{OL} = 24 \text{ mA}$                                                                 |                                     |                       |       | 0.35                                | 0.5                   |       |      |
|                                     |                  | $I_{OL} = 48 \text{ mA}^{\S}$                                                            |                                     |                       |       | 0.4                                 | 0.5                   |       |      |
| $I_I$                               | A or B           | $V_{CC} = \text{MAX}$                                                                    |                                     | $V_I = 5.5 \text{ V}$ | 0.1   |                                     | $V_I = 5.5 \text{ V}$ | 0.1   | mA   |
|                                     | DIR or $\bar{G}$ |                                                                                          |                                     | $V_I = 7 \text{ V}$   | 0.1   |                                     | $V_I = 7 \text{ V}$   | 0.1   |      |
| $I_{IH}$                            |                  | $V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$                                               |                                     | 20                    |       |                                     | 20                    |       | μA   |
| $I_{IL}$                            |                  | $V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$                                               |                                     | – 0.4                 |       |                                     | – 0.4                 |       | mA   |
| $I_{CC}$                            | Outputs high     | $V_{CC} = \text{MAX}, \text{Outputs open}$                                               | 48                                  | 70                    |       | 48                                  | 70                    |       | mA   |
|                                     | Outputs low      |                                                                                          | 62                                  | 90                    |       | 62                                  | 90                    |       |      |
|                                     | Outputs at Hi-Z  |                                                                                          | 64                                  | 95                    |       | 64                                  | 95                    |       |      |

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

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

<sup>§</sup>The 48 mA condition applies for the SN74LS641-1, SN74LS642-1, and SN74LS644-1 only.



SN54LS641, SN54LS642, SN54LS644  
 SN74LS641, SN74LS642, SN74LS644  
 OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

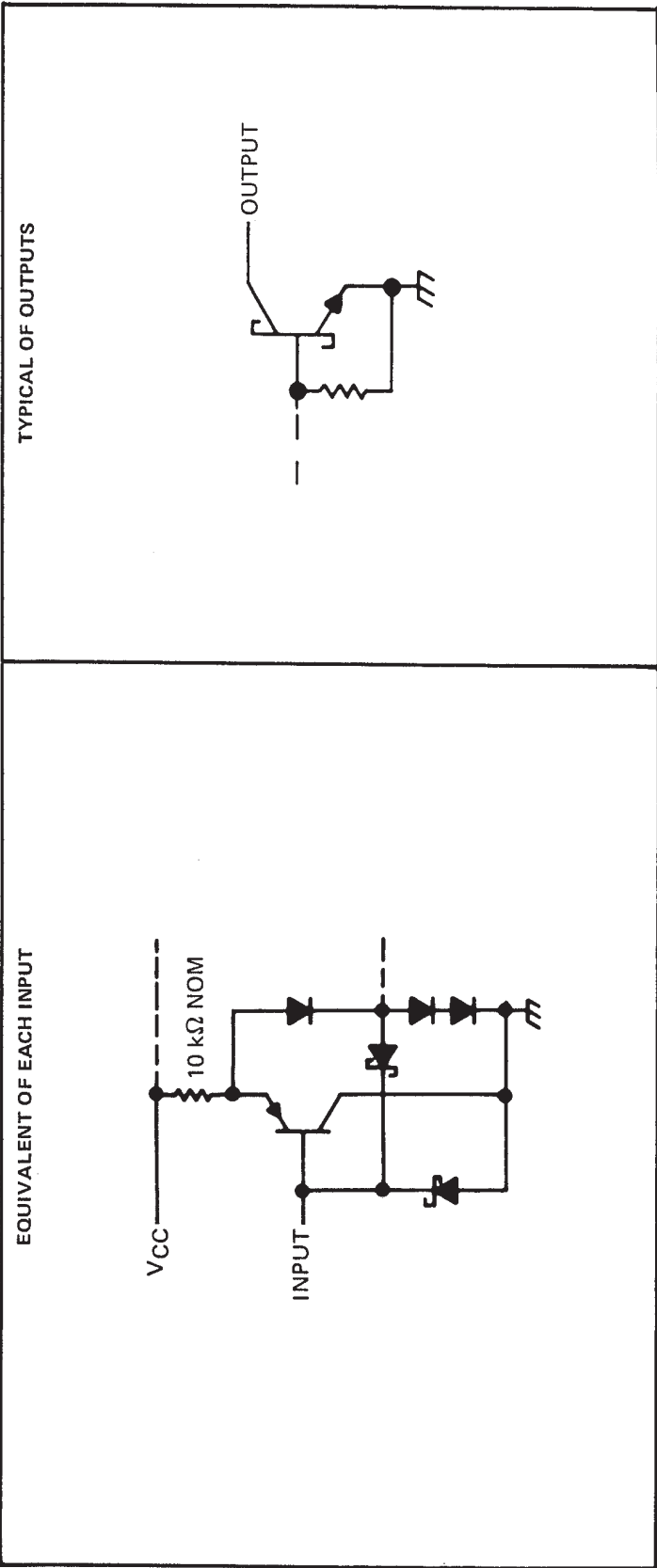
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switching characteristics at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER                                                 | FROM<br>(INPUT) | TO<br>(OUTPUT) | TEST CONDITIONS                                                  | 'LS641, 'LS641-1 |     | 'LS642, 'LS642-1 |     | 'LS644, 'LS644-1 |     | UNIT |
|-----------------------------------------------------------|-----------------|----------------|------------------------------------------------------------------|------------------|-----|------------------|-----|------------------|-----|------|
|                                                           |                 |                |                                                                  | MIN              | TYP | MAX              | MIN | TYP              | MAX |      |
| t <sub>PLH</sub><br>low-to-high-level output              | A               | B              | C <sub>L</sub> = 45 pF,<br>R <sub>L</sub> = 667 Ω,<br>See Note 2 | 17               | 25  | 25               | 19  | 25               | 25  | ns   |
|                                                           | B               | A              |                                                                  | 17               | 25  | 25               | 19  | 25               | 25  |      |
| t <sub>PHL</sub><br>high-to-low-level output              | A               | B              |                                                                  | 16               | 25  | 25               | 14  | 25               | 25  | ns   |
|                                                           | B               | A              |                                                                  | 16               | 25  | 25               | 14  | 25               | 25  |      |
| t <sub>PLH</sub><br>Output disable time<br>from low level | $\bar{G}$ , DIR | A              |                                                                  | 23               | 40  | 40               | 26  | 40               | 40  | ns   |
|                                                           | $\bar{G}$ , DIR | B              |                                                                  | 25               | 40  | 40               | 28  | 40               | 40  |      |
| t <sub>PHL</sub><br>Output enable time<br>from high level | $\bar{G}$ , DIR | A              |                                                                  | 34               | 50  | 50               | 43  | 60               | 60  | ns   |
|                                                           | $\bar{G}$ , DIR | B              |                                                                  | 37               | 50  | 50               | 39  | 60               | 60  |      |

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

schematics of inputs and outputs





**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)             | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|-------------------------------------|-------------------------|
| 5962-8416101VRA  | ACTIVE        | CDIP         | J                  | 20   | 20             | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 5962-8416101VRA<br>A<br>SNV54LS640J | <a href="#">Samples</a> |
| 5962-8416101VSA  | ACTIVE        | CFP          | W                  | 20   | 25             | TBD                        | Call TI          | N / A for Pkg Type   | -55 to 125   | 5962-8416101VSA<br>A<br>SNV54LS640W | <a href="#">Samples</a> |
| 84161012A        | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE       | N / A for Pkg Type   | -55 to 125   | 84161012A<br>SNJ54LS<br>640FK       | <a href="#">Samples</a> |
| 8416101RA        | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 8416101RA<br>SNJ54LS640J            | <a href="#">Samples</a> |
| 8416101SA        | ACTIVE        | CFP          | W                  | 20   | 1              | TBD                        | Call TI          | N / A for Pkg Type   | -55 to 125   | 8416101SA<br>SNJ54LS640W            | <a href="#">Samples</a> |
| SN54LS640J       | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | SN54LS640J                          | <a href="#">Samples</a> |
| SN54LS645J       | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | SN54LS645J                          | <a href="#">Samples</a> |
| SN74LS640-1DW    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640-1                             | <a href="#">Samples</a> |
| SN74LS640-1DWE4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640-1                             | <a href="#">Samples</a> |
| SN74LS640-1DWG4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640-1                             | <a href="#">Samples</a> |
| SN74LS640-1DWR   | OBSOLETE      | SOIC         | DW                 | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                                     |                         |
| SN74LS640-1N     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS640-1N                        | <a href="#">Samples</a> |
| SN74LS640-1NE4   | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS640-1N                        | <a href="#">Samples</a> |
| SN74LS640-1NSR   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640-1                           | <a href="#">Samples</a> |
| SN74LS640-1NSRE4 | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640-1                           | <a href="#">Samples</a> |
| SN74LS640-1NSRG4 | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640-1                           | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LS640DBR     | ACTIVE        | SSOP         | DB                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | LS640                   | <a href="#">Samples</a> |
| SN74LS640DBRE4   | ACTIVE        | SSOP         | DB                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | LS640                   | <a href="#">Samples</a> |
| SN74LS640DBRG4   | ACTIVE        | SSOP         | DB                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | LS640                   | <a href="#">Samples</a> |
| SN74LS640DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640DWE4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640DWG4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640DWR     | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640DWRE4   | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640DWRG4   | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS640                   | <a href="#">Samples</a> |
| SN74LS640N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS640N              | <a href="#">Samples</a> |
| SN74LS640N3      | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS640NE4     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS640N              | <a href="#">Samples</a> |
| SN74LS640NSR     | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640                 | <a href="#">Samples</a> |
| SN74LS640NSRE4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640                 | <a href="#">Samples</a> |
| SN74LS640NSRG4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS640                 | <a href="#">Samples</a> |
| SN74LS641-1DW    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |
| SN74LS641-1DWE4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |
| SN74LS641-1DWG4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LS641-1DWR   | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |
| SN74LS641-1DWRE4 | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |
| SN74LS641-1DWRG4 | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641-1                 | <a href="#">Samples</a> |
| SN74LS641-1N     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS641-1N            | <a href="#">Samples</a> |
| SN74LS641-1N3    | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS641-1NE4   | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS641-1N            | <a href="#">Samples</a> |
| SN74LS641DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641                   | <a href="#">Samples</a> |
| SN74LS641DWE4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641                   | <a href="#">Samples</a> |
| SN74LS641DWG4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS641                   | <a href="#">Samples</a> |
| SN74LS641DWR     | OBSOLETE      | SOIC         | DW                 | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      | LS641                   |                         |
| SN74LS641DWRE4   | OBSOLETE      | SOIC         | DW                 | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS641DWRG4   | OBSOLETE      | SOIC         | DW                 | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS641N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS641N              | <a href="#">Samples</a> |
| SN74LS641N3      | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS641NE4     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS641N              | <a href="#">Samples</a> |
| SN74LS641NSR     | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS641                 | <a href="#">Samples</a> |
| SN74LS641NSRE4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS641                 | <a href="#">Samples</a> |
| SN74LS641NSRG4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS641                 | <a href="#">Samples</a> |
| SN74LS642-1DW    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642-1                 | <a href="#">Samples</a> |
| SN74LS642-1DWE4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642-1                 | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|-------------------------|-------------------------|
| SN74LS642-1DWG4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642-1                 | <a href="#">Samples</a> |
| SN74LS642-1N     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS642-1N            | <a href="#">Samples</a> |
| SN74LS642-1NE4   | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS642-1N            | <a href="#">Samples</a> |
| SN74LS642DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642                   | <a href="#">Samples</a> |
| SN74LS642DWE4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642                   | <a href="#">Samples</a> |
| SN74LS642DWG4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS642                   | <a href="#">Samples</a> |
| SN74LS642N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS642N              | <a href="#">Samples</a> |
| SN74LS642NE4     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS642N              | <a href="#">Samples</a> |
| SN74LS642NSR     | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS642                 | <a href="#">Samples</a> |
| SN74LS642NSRE4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS642                 | <a href="#">Samples</a> |
| SN74LS642NSRG4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS642                 | <a href="#">Samples</a> |
| SN74LS644-1N     | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS644N       | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                         |                         |
| SN74LS645-1DW    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |
| SN74LS645-1DWE4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |
| SN74LS645-1DWG4  | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |
| SN74LS645-1DWR   | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |
| SN74LS645-1DWRE4 | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |
| SN74LS645-1DWRG4 | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645-1                 | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)       | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|-------------------------------|-------------------------|
| SN74LS645-1N     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS645-1N                  | <a href="#">Samples</a> |
| SN74LS645-1N3    | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                               |                         |
| SN74LS645-1NE4   | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS645-1N                  | <a href="#">Samples</a> |
| SN74LS645-1NSR   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645-1                     | <a href="#">Samples</a> |
| SN74LS645-1NSRE4 | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645-1                     | <a href="#">Samples</a> |
| SN74LS645-1NSRG4 | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645-1                     | <a href="#">Samples</a> |
| SN74LS645DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645                         | <a href="#">Samples</a> |
| SN74LS645DWE4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645                         | <a href="#">Samples</a> |
| SN74LS645DWG4    | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | LS645                         | <a href="#">Samples</a> |
| SN74LS645DWR     | OBSOLETE      | SOIC         | DW                 | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                               |                         |
| SN74LS645N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS645N                    | <a href="#">Samples</a> |
| SN74LS645N3      | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI          | Call TI              | 0 to 70      |                               |                         |
| SN74LS645NE4     | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | 0 to 70      | SN74LS645N                    | <a href="#">Samples</a> |
| SN74LS645NSR     | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645                       | <a href="#">Samples</a> |
| SN74LS645NSRE4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645                       | <a href="#">Samples</a> |
| SN74LS645NSRG4   | ACTIVE        | SO           | NS                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | 0 to 70      | 74LS645                       | <a href="#">Samples</a> |
| SNJ54LS640FK     | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE       | N / A for Pkg Type   | -55 to 125   | 84161012A<br>SNJ54LS<br>640FK | <a href="#">Samples</a> |
| SNJ54LS640J      | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 8416101RA<br>SNJ54LS640J      | <a href="#">Samples</a> |
| SNJ54LS640W      | ACTIVE        | CFP          | W                  | 20   | 1              | TBD                        | Call TI          | N / A for Pkg Type   | -55 to 125   | 8416101SA<br>SNJ54LS640W      | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2) | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|------------------|----------------------|--------------|-------------------------|-------------------------|
| SNJ54LS645FK     | NRND          | LCCC         | FK                 | 20   | 1              | TBD             | POST-PLATE       | N / A for Pkg Type   | -55 to 125   | SNJ54LS<br>645FK        |                         |
| SNJ54LS645J      | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD             | A42              | N / A for Pkg Type   | -55 to 125   | SNJ54LS645J             | <a href="#">Samples</a> |
| SNJ54LS645W      | OBSOLETE      | CFP          | W                  | 20   |                | TBD             | Call TI          | Call TI              | -55 to 125   |                         |                         |

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

**ACTIVE:** Product device recommended for new designs.

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

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

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

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

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

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

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

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

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

(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.

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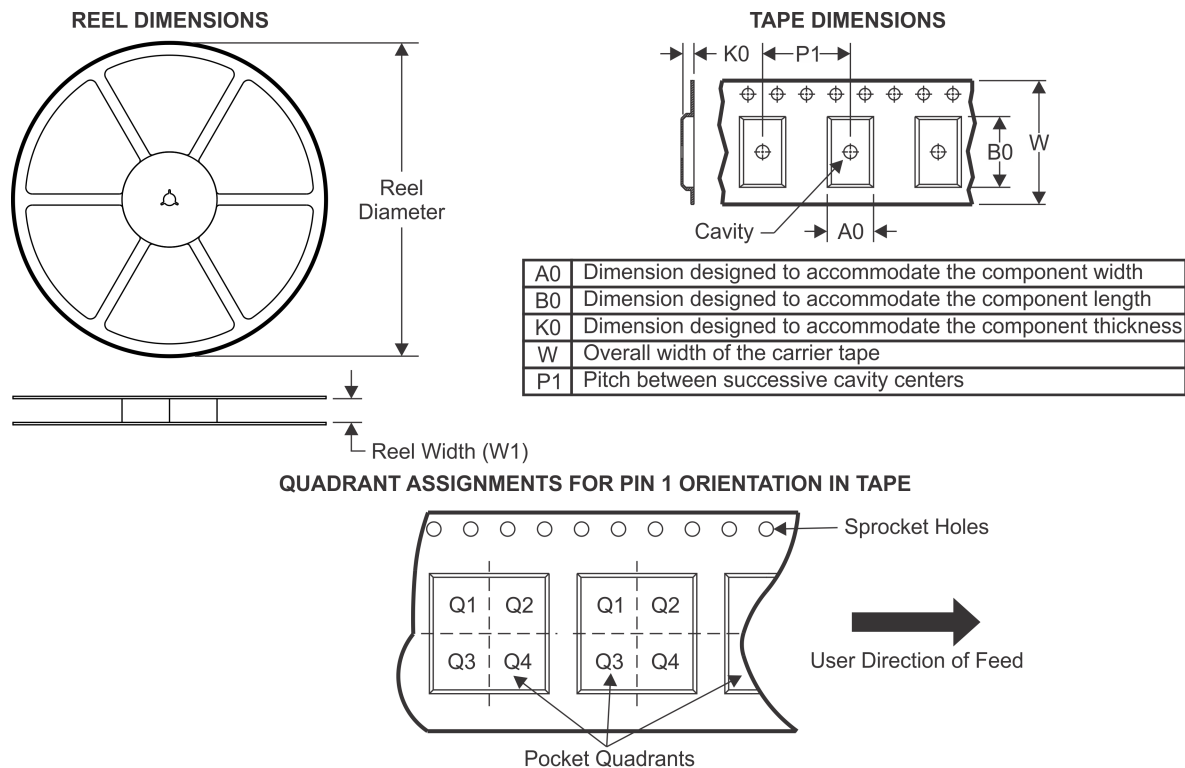
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**OTHER QUALIFIED VERSIONS OF SN54LS640, SN54LS640-SP, SN54LS645, SN74LS640, SN74LS645 :**

- Catalog: [SN74LS640](#), [SN54LS640](#), [SN74LS645](#)
- Military: [SN54LS640](#), [SN54LS645](#)
- Space: [SN54LS640-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

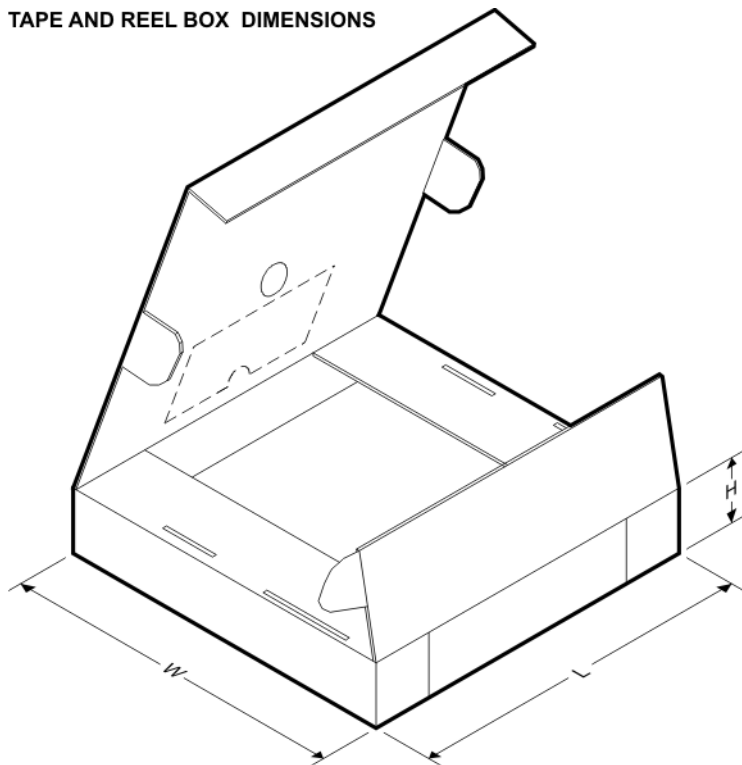
**TAPE AND REEL INFORMATION**


\*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 |
|----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LS640-1NSR | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS640DBR   | SSOP         | DB              | 20   | 2000 | 330.0              | 16.4               | 8.2     | 7.5     | 2.5     | 12.0    | 16.0   | Q1            |
| SN74LS640DWR   | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS640NSR   | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS641-1DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS641NSR   | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS642NSR   | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS645-1DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LS645-1NSR | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LS645NSR   | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.2     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |



## TAPE AND REEL BOX DIMENSIONS



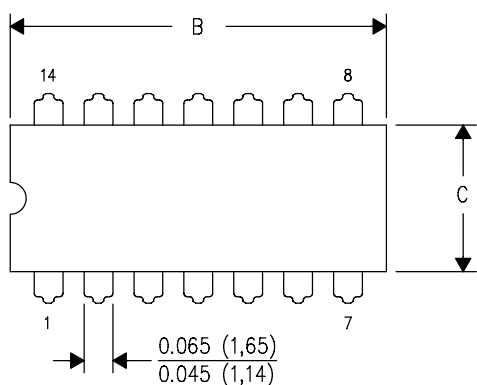
\*All dimensions are nominal

| Device         | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LS640-1NSR | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS640DBR   | SSOP         | DB              | 20   | 2000 | 367.0       | 367.0      | 38.0        |
| SN74LS640DWR   | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS640NSR   | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS641-1DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS641NSR   | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS642NSR   | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS645-1DWR | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS645-1NSR | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LS645NSR   | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |

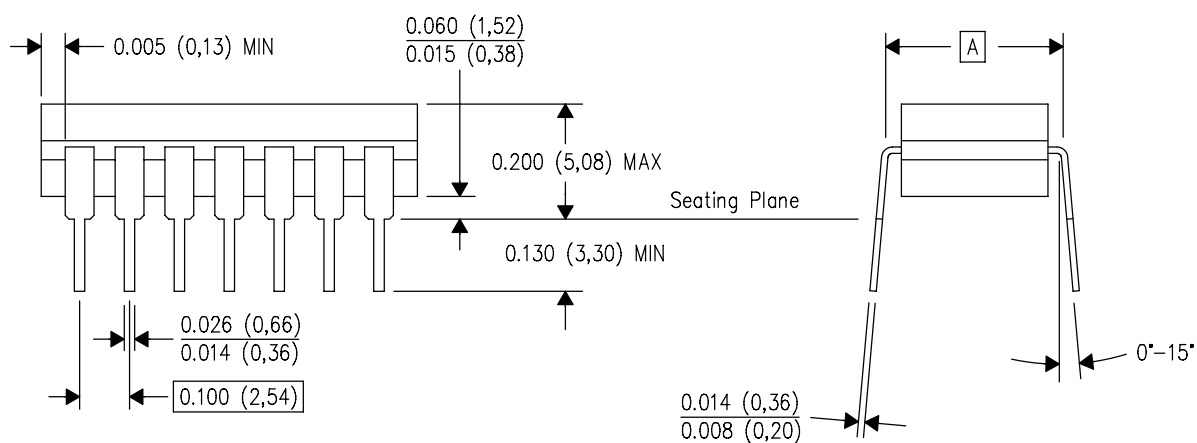
J (R-GDIP-T\*\*)

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)        |

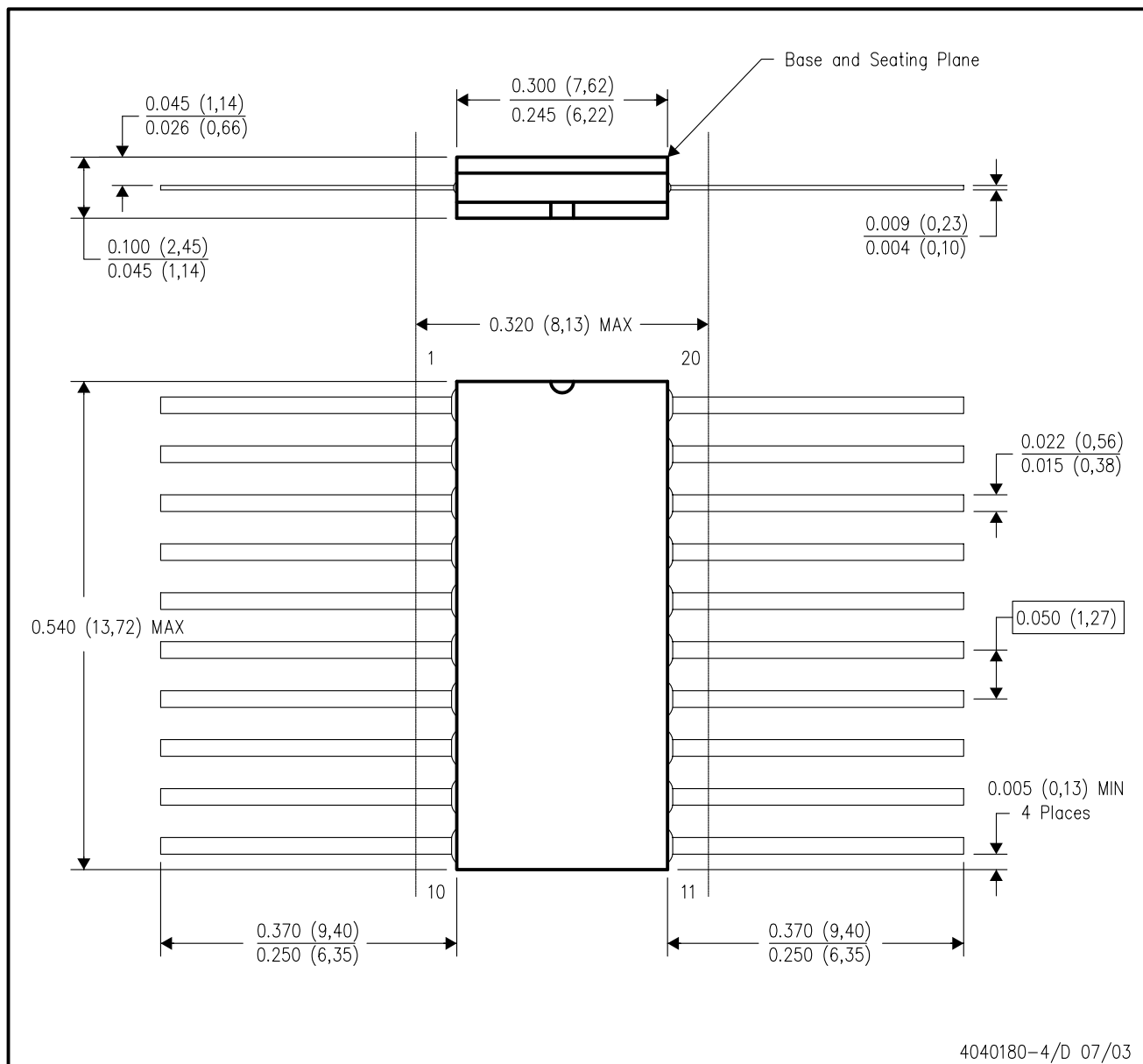


4040083/F 03/03

- 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.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK

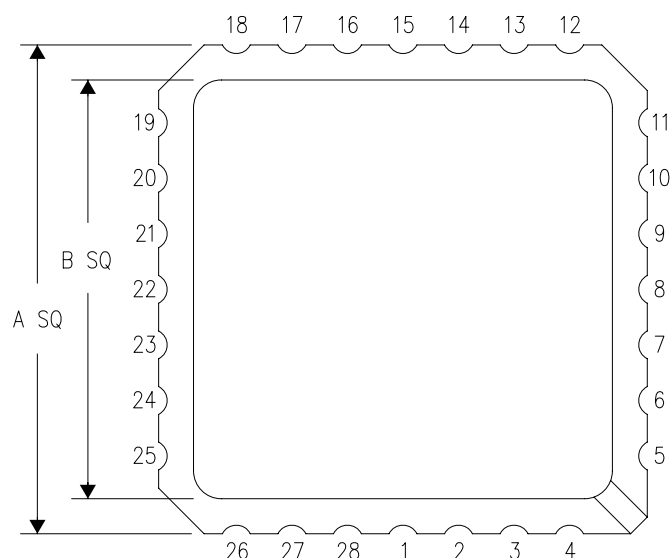


- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only.
  - Falls within Mil-Std 1835 GDFP2-F20

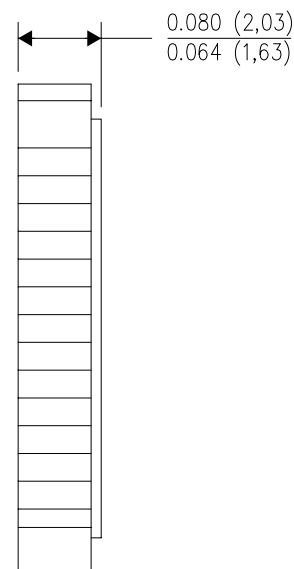
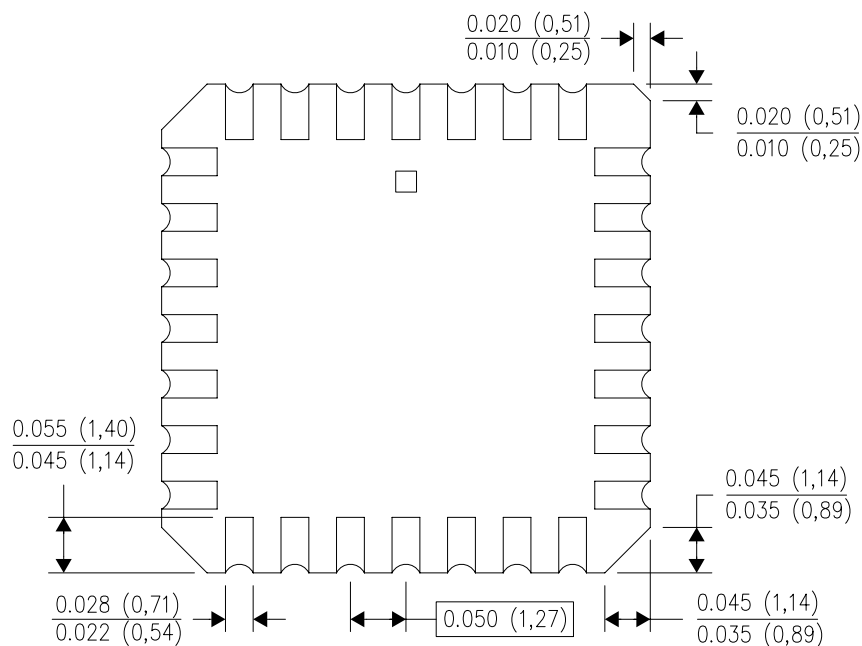
FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF<br>TERMINALS<br>** | 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)  |

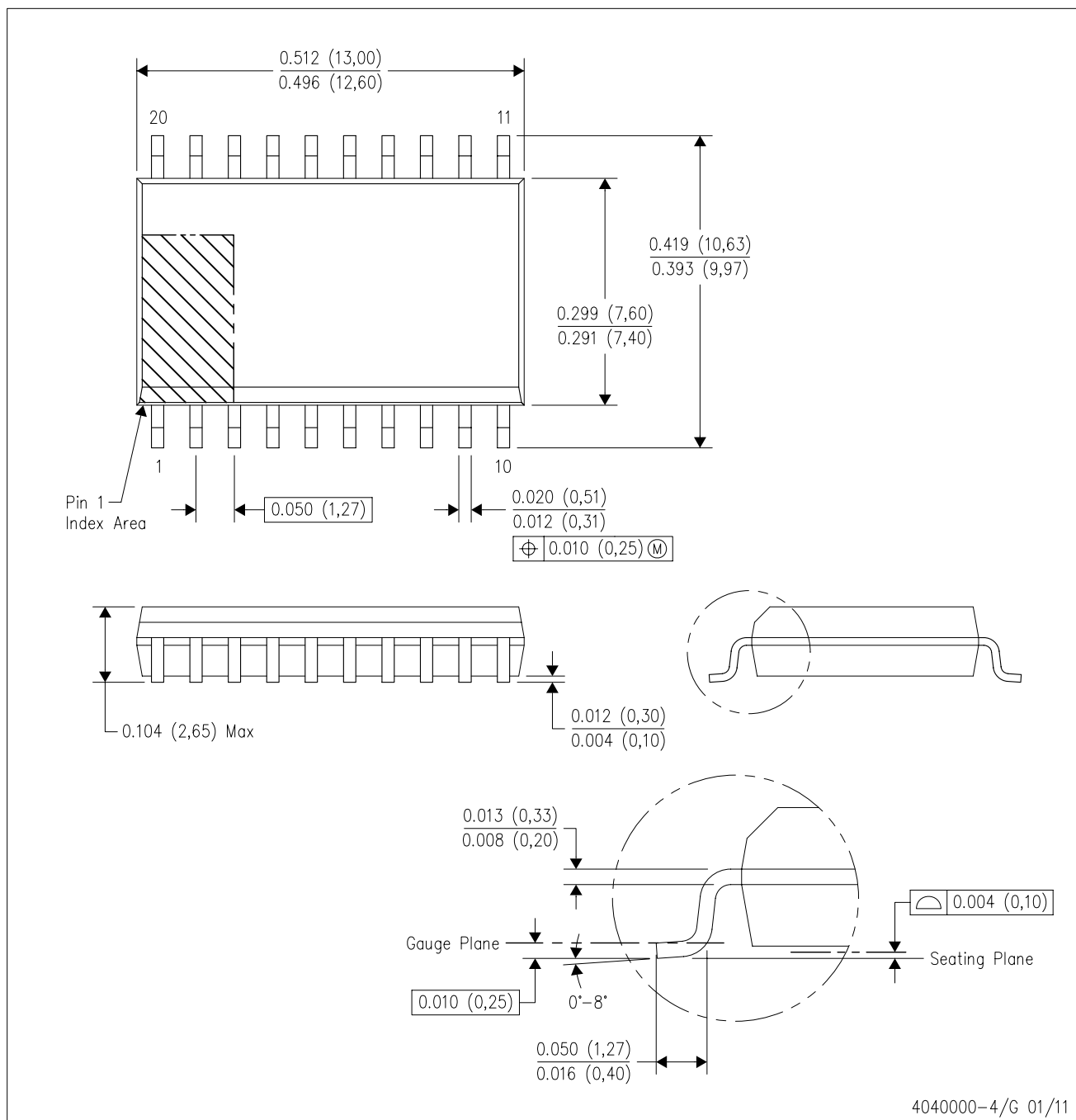


4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004

DW (R-PDSO-G20)

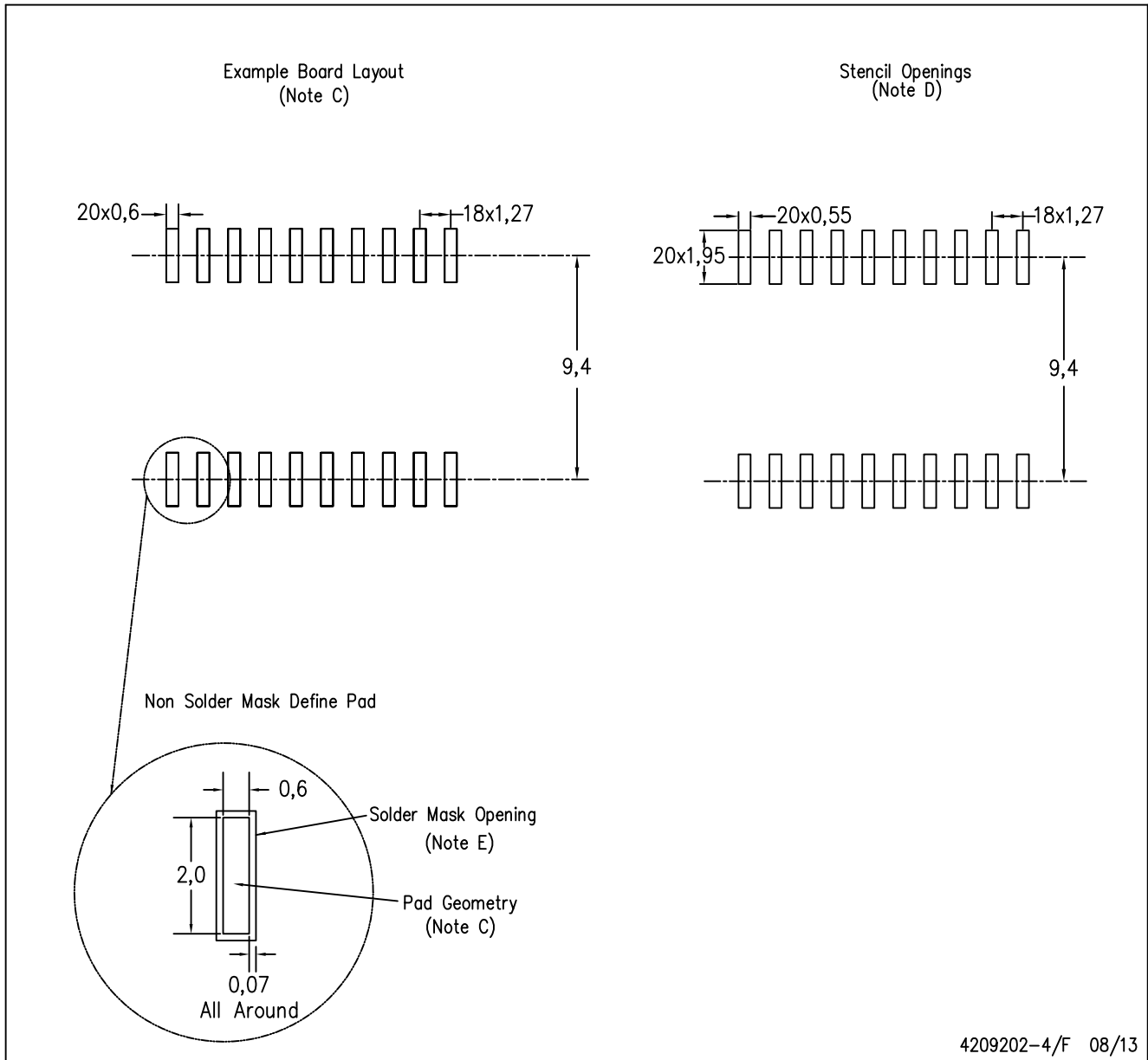
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - D. Falls within JEDEC MS-013 variation AC.

DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



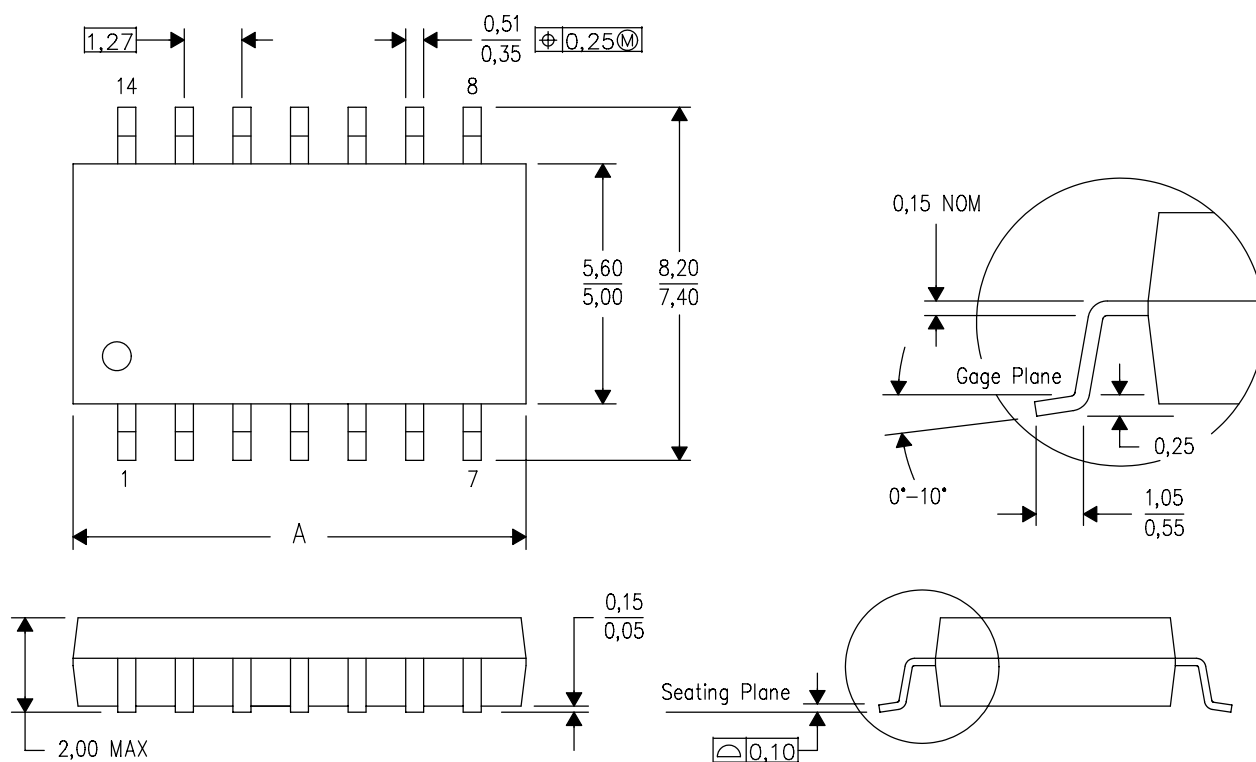
- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



| DIM \ PINS ** | 14    | 16    | 20    | 24    |
|---------------|-------|-------|-------|-------|
| A MAX         | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN         | 9,90  | 9,90  | 12,30 | 14,70 |

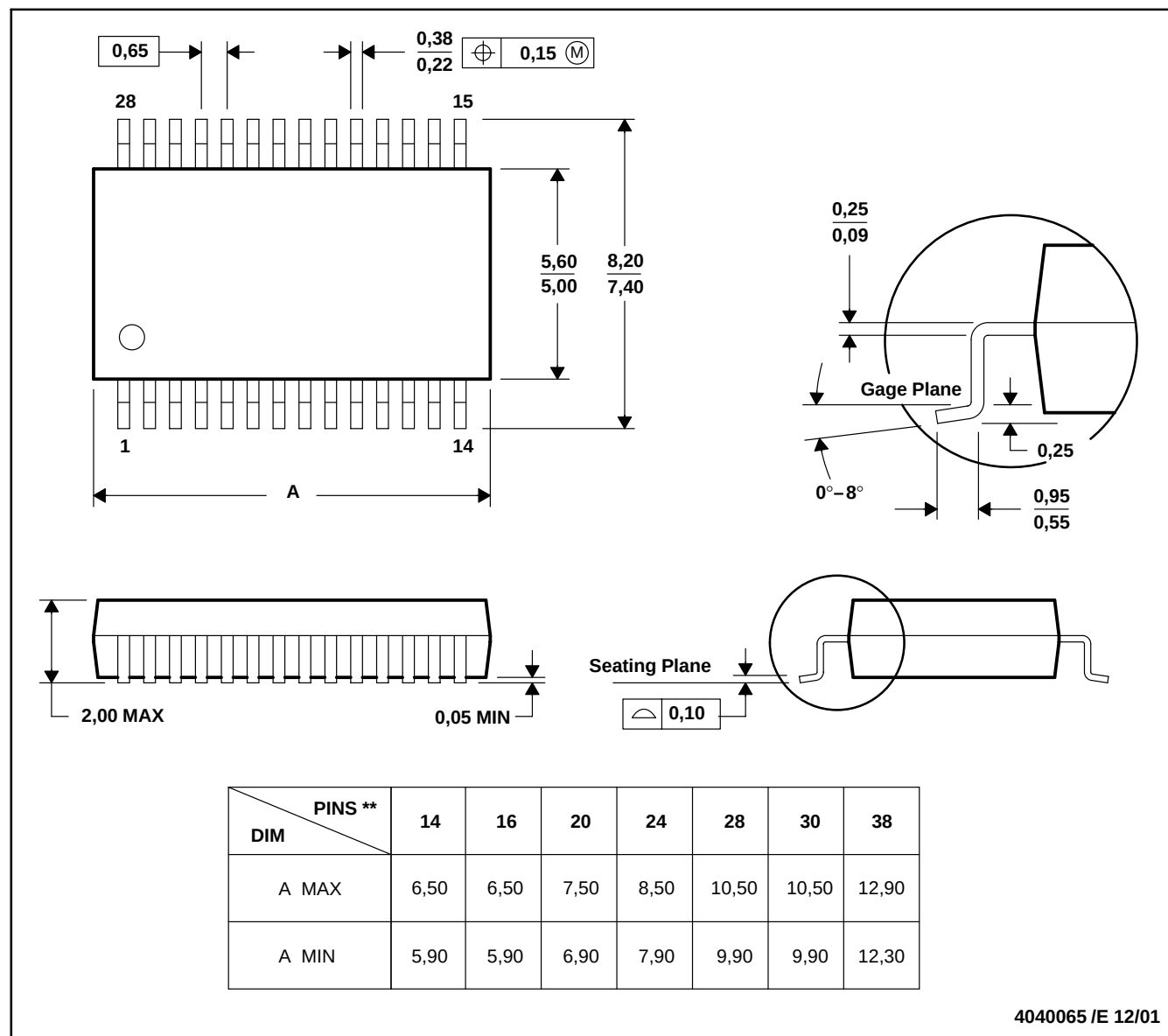
4040062/C 03/03

- 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.

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

## PLASTIC SMALL-OUTLINE

28 PINS SHOWN



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion not to exceed 0,15.
  - Falls within JEDEC MO-150



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