

# SN5476, SN54LS76A SN7476, SN74LS76A DUAL J-K FLIP-FLOPS WITH PRESET AND CLEAR

SDLS121 – DECEMBER 1983 – REVISED MARCH 1988

- Package Options Include Plastic and Ceramic DIPs and Ceramic Flat Packages
- Dependable Texas Instruments Quality and Reliability

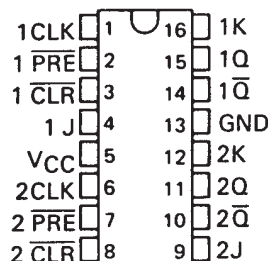
## description

The '76 contains two independent J-K flip-flops with individual J-K, clock, preset, and clear inputs. The '76 is a positive-edge-triggered flip-flop. J-K input is loaded into the master while the clock is high and transferred to the slave on the high-to-low transition. For these devices the J and K inputs must be stable while the clock is high.

The 'LS76A contain two independent negative-edge-triggered flip-flops. The J and K inputs must be stable one setup time prior to the high-to-low clock transition for predicatble operation. The preset and clear are asynchronous active low inputs. When low they override the clock and data inputs forcing the outputs to the steady state levels as shown in the function table.

The SN5476 and the SN54LS76A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7476 and the SN74LS76A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN5476, SN54LS76A . . . J PACKAGE  
SN7476 . . . N PACKAGE  
SN74LS76A . . . D OR N PACKAGE  
(TOP VIEW)



'76  
FUNCTION TABLE

| INPUTS |     |              |   |   | OUTPUTS        |                |
|--------|-----|--------------|---|---|----------------|----------------|
| PRE    | CLR | CLK          | J | K | Q              | $\bar{Q}$      |
| L      | H   | X            | X | X | H              | L              |
| H      | L   | X            | X | X | L              | H              |
| L      | L   | X            | X | X | H <sup>†</sup> | H <sup>†</sup> |
| H      | H   | $\downarrow$ | L | L | Q <sub>0</sub> | $\bar{Q}_0$    |
| H      | H   | $\downarrow$ | H | L | H              | L              |
| H      | H   | $\downarrow$ | L | H | L              | H              |
| H      | H   | $\downarrow$ | H | H | TOGGLE         |                |

'LS76A  
FUNCTION TABLE

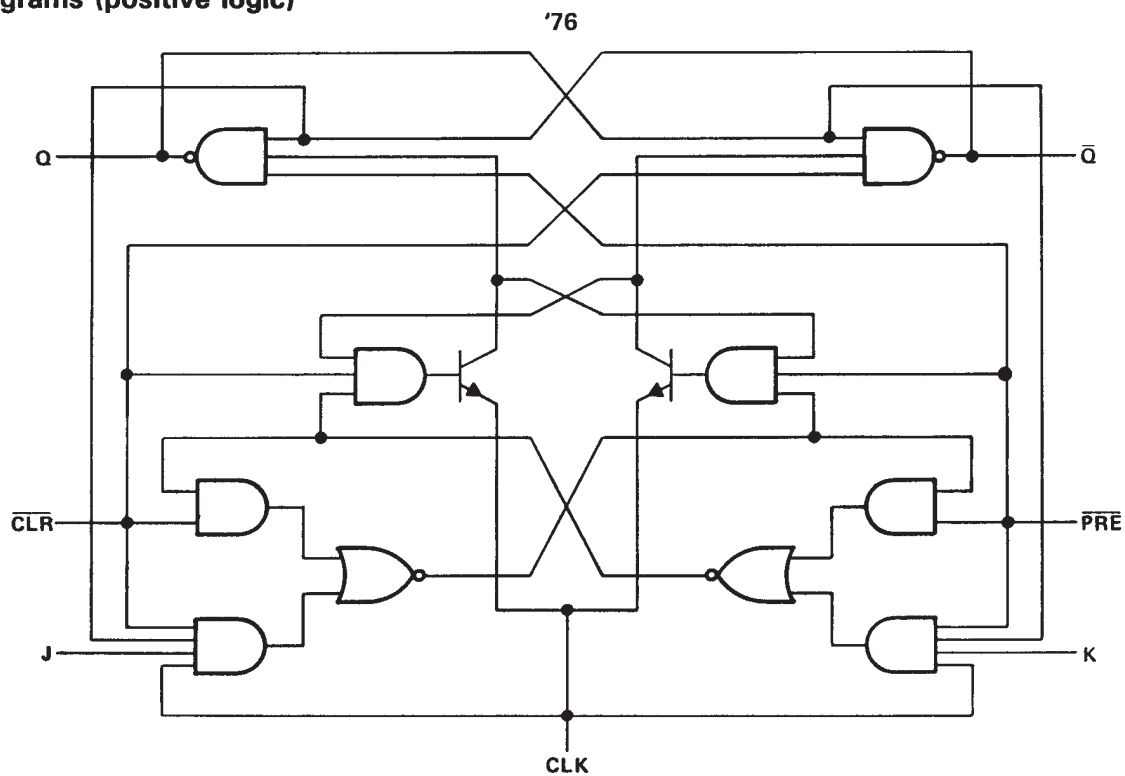
| INPUTS |     |              |   |   | OUTPUTS        |                |
|--------|-----|--------------|---|---|----------------|----------------|
| PRE    | CLR | CLK          | J | K | Q              | $\bar{Q}$      |
| L      | H   | X            | X | X | H              | L              |
| H      | L   | X            | X | X | L              | H              |
| L      | L   | X            | X | X | H <sup>†</sup> | H <sup>†</sup> |
| H      | H   | $\downarrow$ | L | L | Q <sub>0</sub> | $\bar{Q}_0$    |
| H      | H   | $\downarrow$ | H | L | H              | L              |
| H      | H   | $\downarrow$ | L | H | L              | H              |
| H      | H   | $\downarrow$ | H | H | TOGGLE         |                |
| H      | H   | H            | X | X | Q <sub>0</sub> | $\bar{Q}_0$    |

<sup>†</sup> This configuration is nonstable; that is, it will not persist when either preset or clear returns to its inactive (high) level.

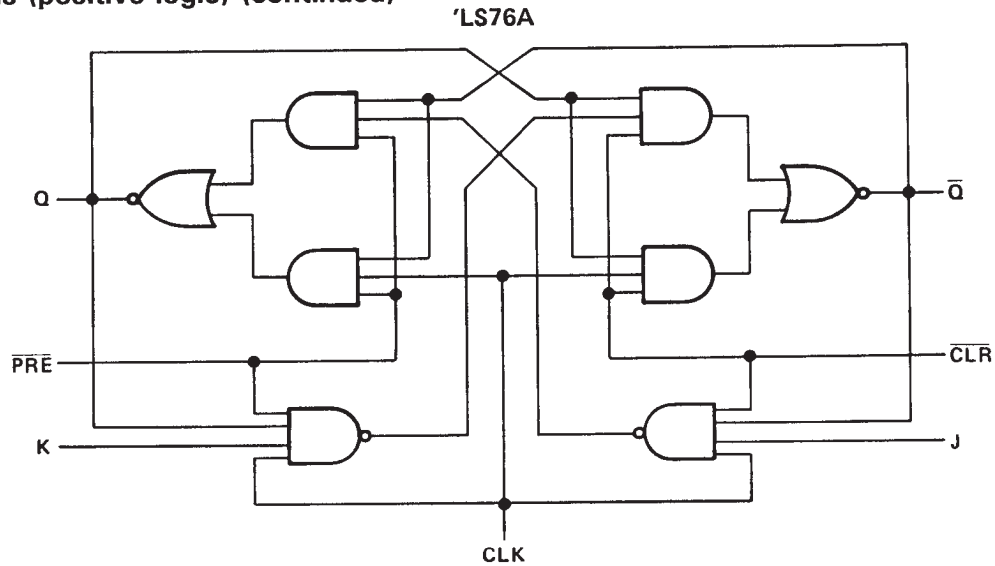
SN5476, SN54LS76A  
SN7476, SN74LS76A  
DUAL J-K FLIP-FLOPS WITH PRESET AND CLEAR

SDLS121 – DECEMBER 1983 – REVISED MARCH 1988

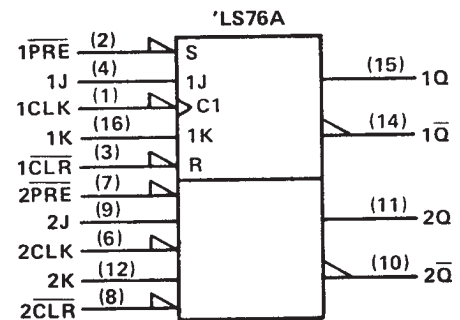
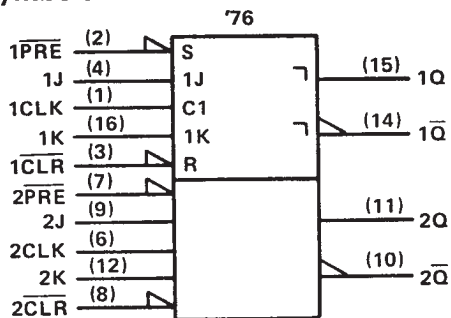
logic diagrams (positive logic)



logic diagrams (positive logic) (continued)

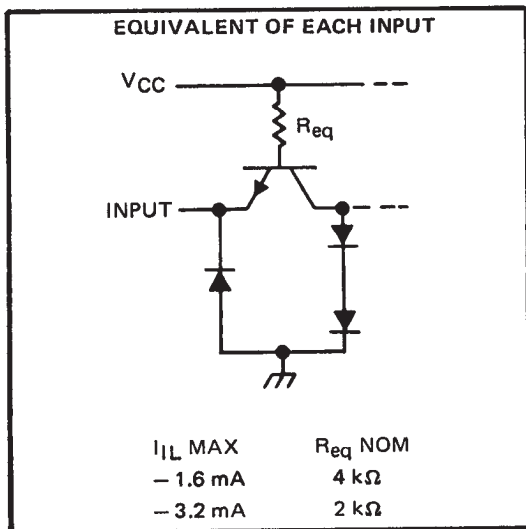


logic symbols†

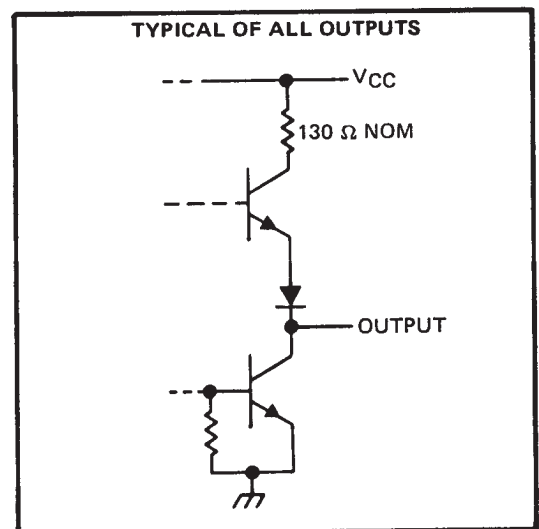


†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

schematics of inputs and outputs

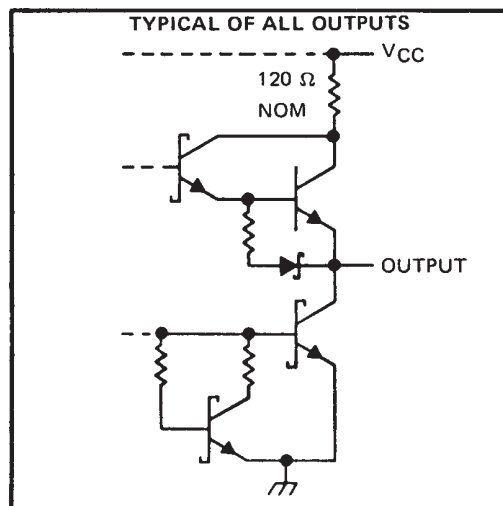


'76



## SDLS121 – DECEMBER 1983 – REVISED MARCH 1988

**'LS76A**



|  |                |
|--|----------------|
| Supply voltage, V <sub>CC</sub> (see Note 1) ..... | 7 V            |
| Input voltage: '76 .....                           | 5.5 V          |
| 'LS76A .....                                       | 7 V            |
| Operating free-air temperature range: SN54' .....  | –55°C to 125°C |
| SN74' .....  | 0°C to 70°C    |
| Storage temperature range .....                    | –65°C to 150°C |



4

SN5476, SN54LS76A  
SN7476, SN74LS76A  
**DUAL J-K FLIP-FLOPS WITH PRESET AND CLEAR**  
SDLS121 – DECEMBER 1983 – REVISED MARCH 1988

**recommended operating conditions**

|                 |                                  | SN5476 |                |       | SN7476 |     |       | UNIT |
|-----------------|----------------------------------|--------|----------------|-------|--------|-----|-------|------|
|                 |                                  | MIN    | NOM            | MAX   | MIN    | NOM | MAX   |      |
| V <sub>CC</sub> | Supply voltage                   | 4.5    | 5              | 5.5   | 4.75   | 5   | 5.25  | V    |
| V <sub>IH</sub> | High-level input voltage         | 2      |                |       | 2      |     |       | V    |
| V <sub>IL</sub> | Low-level input voltage          |        |                | 0.8   |        |     | 0.8   | V    |
| I <sub>OH</sub> | High-level output current        |        |                | – 0.4 |        |     | – 0.4 | mA   |
| I <sub>OL</sub> | Low-level output current         |        |                | 16    |        |     | 16    | mA   |
| t <sub>w</sub>  | Pulse duration                   |        | CLK high       | 20    |        | 20  |       | ns   |
|                 |                                  |        | CLK low        | 47    |        | 47  |       |      |
|                 |                                  |        | PRE or CLR low | 25    |        | 25  |       |      |
| t <sub>su</sub> | Input setup time before CLK ↑    | 0      |                |       | 0      |     |       | ns   |
| t <sub>h</sub>  | Input hold time-data after CLK ↓ | 0      |                |       | 0      |     |       | ns   |
| T <sub>A</sub>  | Operating free-air temperature   | – 55   |                | 125   | 0      |     | 70    | °C   |

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

| PARAMETER         |            | TEST CONDITIONS†  |  | SN5476 |      |       | SN7476 |      |       | UNIT |
|-------------------|------------|---|--|--------|------|-------|--------|------|-------|------|
|                   |            |   |  | MIN    | TYP‡ | MAX   | MIN    | TYP‡ | MAX   |      |
| V <sub>IK</sub>   |            | V <sub>CC</sub> = MIN, I <sub>I</sub> = – 12 mA   |  |        |      | – 1.5 |        |      | – 1.5 | V    |
| V <sub>OH</sub>   |            | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = – 0.4 mA |  | 2.4    | 3.4  |       | 2.4    | 3.4  |       | V    |
| V <sub>OL</sub>   |            | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 16 mA    |  |        | 0.2  | 0.4   |        | 0.2  | 0.4   | V    |
| I <sub>I</sub>    |            | V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V   |  |        |      | 1     |        |      | 1     | mA   |
| I <sub>IH</sub>   | J or K     | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V   |  |        |      | 40    |        |      | 40    | μA   |
|                   | All other  |   |  |        |      | 80    |        |      | 80    |      |
| I <sub>IL</sub>   | J or K     | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V   |  |        |      | – 1.6 |        |      | – 1.6 | mA   |
|                   | All other¶ |   |  |        |      | – 3.2 |        |      | – 3.2 |      |
| I <sub>OS</sub> § |            | V <sub>CC</sub> = MAX   |  | – 20   |      | – 57  | – 18   |      | – 57  | mA   |
| I <sub>CC</sub> # |            | V <sub>CC</sub> = MAX, See Note 2   |  |        | 10   | 20    |        | 10   | 20    | mA   |

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

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

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

¶ Clear is tested with preset high and preset is tested with clear high.

# Average per flip-flop.

NOTE 2: With all outputs open, I<sub>CC</sub> is measured with the Q and  $\bar{Q}$  outputs high in turn. At the time of measurement, the clock input is grounded.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 3)**

| PARAMETER        | FROM<br>(INPUT)                                    | TO<br>(OUTPUT)             | TEST CONDITIONS   | MIN | TYP | MAX | UNIT |
|------------------|--|----------------------------|---|-----|-----|-----|------|
| f <sub>max</sub> |  |                            | R <sub>L</sub> = 400 Ω,                    C <sub>L</sub> = 15 pF | 15  | 20  |     | MHz  |
| t <sub>PLH</sub> | $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ | Q or $\overline{\text{Q}}$ |   |     | 16  | 25  | ns   |
| t <sub>PHL</sub> |  |                            |   |     | 25  | 40  | ns   |
| t <sub>PLH</sub> | CLK  | Q or $\overline{\text{Q}}$ |   |     | 16  | 25  | ns   |
| t <sub>PHL</sub> |  |                            |   |     | 25  | 40  | ns   |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



# SN5476, SN54LS76A SN7476, SN74LS76A DUAL J-K FLIP-FLOPS WITH PRESET AND CLEAR

SDLS121 – DECEMBER 1983 – REVISED MARCH 1988

## recommended operating conditions

|                    |                                |  | SN54LS76A |     |       | SN74LS76A |     |       | UNIT |
|--------------------|--------------------------------|--|-----------|-----|-------|-----------|-----|-------|------|
|                    |                                |  | MIN       | NOM | MAX   | MIN       | NOM | MAX   |      |
| V <sub>CC</sub>    | Supply voltage                 |  | 4.5       | 5   | 5.5   | 4.75      | 5   | 5.75  | V    |
| V <sub>IH</sub>    | High-level input voltage       |  | 2         |     |       | 2         |     |       | V    |
| V <sub>IL</sub>    | Low-level input voltage        |  |           |     | 0.7   |           |     | 0.8   | V    |
| I <sub>OH</sub>    | High-level output current      |  |           |     | – 0.4 |           |     | – 0.4 | mA   |
| I <sub>OL</sub>    | Low-level output current       |  |           |     | 4     |           |     | 8     | mA   |
| f <sub>clock</sub> | Clock frequency                |  | 0         |     | 30    | 0         |     | 30    | MHz  |
| t <sub>w</sub>     | Pulse duration                 | CLK high   | 20        |     |       | 20        |     |       | ns   |
|                    |                                | $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ low | 25        |     |       | 25        |     |       |      |
| t <sub>su</sub>    | Setup time before CLK↓         | data high or low                                       | 20        |     |       | 20        |     |       | ns   |
|                    |                                | $\overline{\text{CLR}}$ inactive                       | 20        |     |       | 20        |     |       |      |
|                    |                                | $\overline{\text{PRE}}$ inactive                       | 25        |     |       | 25        |     |       |      |
| t <sub>h</sub>     | Hold time-data after CLK↓      |  | 0         |     |       | 0         |     |       | ns   |
| T <sub>A</sub>     | Operating free-air temperature |  | – 55      |     | 125   | 0         |     | 70    | °C   |

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

| PARAMETER               |  | TEST CONDITIONS†  | SN54LS76A |      |       | SN74LS76A |      |       | UNIT |
|-------------------------|--|---|-----------|------|-------|-----------|------|-------|------|
|                         |  |   | MIN       | TYP‡ | MAX   | MIN       | TYP‡ | MAX   |      |
| V <sub>IK</sub>         |  | V <sub>CC</sub> = MIN, I <sub>I</sub> = – 18 mA   |           |      | – 1.5 |           |      | – 1.5 | V    |
| V <sub>OH</sub>         |  | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = – 0.4 mA | 2.5       | 3.4  |       | 2.7       | 3.4  |       | V    |
| V <sub>OL</sub>         |  | V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 4 mA     |           | 0.25 | 0.4   |           | 0.25 | 0.4   | V    |
|                         |  | V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 8 mA     |           |      |       |           | 0.35 | 0.5   |      |
|                         |  |   |           |      |       |           |      |       |      |
| I <sub>I</sub>          | J or K   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V   |           |      | 0.1   |           |      | 0.1   | mA   |
|                         | $\overline{\text{CLR}}$ or $\overline{\text{PRE}}$ |   |           |      | 0.3   |           |      | 0.3   |      |
|                         | CLK  |   |           |      | 0.4   |           |      | 0.4   |      |
| I <sub>IH</sub>         | J or K   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V   |           |      | 20    |           |      | 20    | μA   |
|                         | $\overline{\text{CLR}}$ or $\overline{\text{PRE}}$ |   |           |      | 60    |           |      | 60    |      |
|                         | CLK  |   |           |      | 80    |           |      | 80    |      |
| I <sub>IL</sub>         | J or K   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V   |           |      | – 0.4 |           |      | – 0.4 | mA   |
|                         | All other  |   |           |      | – 0.8 |           |      | – 0.8 |      |
| I <sub>OS</sub> §       |  | V <sub>CC</sub> = MAX, See Note 4   | – 20      |      | – 100 | – 20      |      | – 100 | mA   |
| I <sub>CC</sub> (Total) |  | V <sub>CC</sub> = MAX, See Note 2   |           | 4    | 6     |           | 4    | 6     | mA   |

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

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

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

NOTE 2: With all outputs open, I<sub>CC</sub> is measured with the Q and  $\overline{\text{Q}}$  outputs high in turn. At the time of measurement, the clock input is grounded.

NOTE 4: For certain devices where state commutation can be caused by shorting an output to ground, an equivalent test may be performed with V<sub>O</sub> = 2.25 V and 2.125 V for the 54 family and the 74 family, respectively, with the minimum and maximum limits reduced to one half of their stated values.

## switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 3)

| PARAMETER        | FROM (INPUT)   | TO (OUTPUT)                | TEST CONDITIONS                               |  | MIN | TYP | MAX | UNIT |
|------------------|--|----------------------------|---|--|-----|-----|-----|------|
| f <sub>max</sub> |  |                            | R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF |  | 30  | 45  |     | MHz  |
| t <sub>PLH</sub> | $\overline{\text{PRE}}$ , $\overline{\text{CLR}}$ or CLK | Q or $\overline{\text{Q}}$ |   |  |     | 15  | 20  | ns   |
| t <sub>PHL</sub> |  |                            |   |  |     | 15  | 20  | ns   |

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|----------------------|------------------------------|-----------------------------|
| 5962-9557501QEA  | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | Call TI              | Call TI                      |                             |
| 5962-9557501QFA  | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | Call TI              | Call TI                      |                             |
| 5962-9557501QFA  | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | Call TI              | Call TI                      |                             |
| 7601301EA        | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | Call TI              | Call TI                      |                             |
| 7601301EA        | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | Call TI              | Call TI                      |                             |
| JM38510/00204BEA | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| JM38510/00204BEA | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| M38510/00204BEA  | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| M38510/00204BEA  | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SN5476J          | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SN5476J          | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SN54LS76AJ       | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SN54LS76AJ       | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SN7476N          | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN7476N          | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN7476N3         | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN7476N3         | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AD       | OBSOLETE              | SOIC         | D               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AD       | OBSOLETE              | SOIC         | D               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76ADR      | OBSOLETE              | SOIC         | D               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76ADR      | OBSOLETE              | SOIC         | D               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AN       | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AN       | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AN3      | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SN74LS76AN3      | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI              | Call TI                      |                             |
| SNJ5476J         | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ5476J         | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ5476W         | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ5476W         | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ54LS76AJ      | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|----------------------|------------------------------|-----------------------------|
| SNJ54LS76AJ      | ACTIVE                | CDIP         | J               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ54LS76AW      | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |
| SNJ54LS76AW      | ACTIVE                | CFP          | W               | 16   | 1           | TBD                     | A42                  | N / A for Pkg Type           |                             |

<sup>(1)</sup> 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.

<sup>(2)</sup> 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)

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

**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 SN5476, SN54LS76A, SN7476, SN74LS76A :

● Catalog: [SN7476](#), [SN74LS76A](#)

● Military: [SN5476](#), [SN54LS76A](#)

NOTE: Qualified Version Definitions:



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

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-F16)

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 GDFP1-F16 and JEDEC MO-092AC

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.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



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

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### Products

|                        |  |
|------------------------|--|
| Audio                  | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                               |
| Amplifiers             | <a href="http://amplifier.ti.com">amplifier.ti.com</a>                               |
| Data Converters        | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>                       |
| DLP® Products          | <a href="http://www.dlp.com">www.dlp.com</a>   |
| DSP                    | <a href="http://dsp.ti.com">dsp.ti.com</a>   |
| Clocks and Timers      | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>                             |
| Interface              | <a href="http://interface.ti.com">interface.ti.com</a>                               |
| Logic                  | <a href="http://logic.ti.com">logic.ti.com</a>                                       |
| Power Mgmt             | <a href="http://power.ti.com">power.ti.com</a>                                       |
| Microcontrollers       | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a>                   |
| RFID                   | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>                                 |
| OMAP Mobile Processors | <a href="http://www.ti.com/omap">www.ti.com/omap</a>                                 |
| Wireless Connectivity  | <a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a> |

### Applications

|                               |  |
|-------------------------------|--|
| Automotive and Transportation | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>                         |
| Communications and Telecom    | <a href="http://www.ti.com/communications">www.ti.com/communications</a>                 |
| Computers and Peripherals     | <a href="http://www.ti.com/computers">www.ti.com/computers</a>                           |
| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
| Energy and Lighting           | <a href="http://www.ti.com/energy">www.ti.com/energy</a>                                 |
| Industrial                    | <a href="http://www.ti.com/industrial">www.ti.com/industrial</a>                         |
| Medical                       | <a href="http://www.ti.com/medical">www.ti.com/medical</a>                               |
| Security                      | <a href="http://www.ti.com/security">www.ti.com/security</a>                             |
| Space, Avionics and Defense   | <a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a> |
| Video and Imaging             | <a href="http://www.ti.com/video">www.ti.com/video</a>                                   |

TI E2E Community Home Page

[e2e.ti.com](http://e2e.ti.com)

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2012, Texas Instruments Incorporated