

# SN54LS592, SN54LS593, SN74LS592, SN74LS593 8-BIT BINARY COUNTERS WITH INPUT REGISTERS

SDLS004

D2633, JANUARY 1981—REVISED MARCH 1988

- Parallel Register Inputs ('LS592)
- Parallel 3-State I/O: Register Inputs/Counter Outputs ('LS593)
- Counter has Direct Overriding Load and Clear
- Accurate Counter Frequency: DC to 20 MHz

## description

The 'LS592 comes in a 16-pin package and consists of a parallel input, 8-bit storage register feeding an 8-bit binary counter. Both the register and the counter have individual positive-edge-triggered clocks. In addition, the counter has direct load and clear functions. A low-going  $\overline{RCO}$  pulse will be obtained when the counter reaches the hex word FF. Expansion is easily accomplished for two stages by connecting  $\overline{RCO}$  of the first stage to  $\overline{CCKEN}$  of the second stage. Cascading for larger count chains can be accomplished by connecting  $\overline{RCO}$  of each stage to CCK of the following stage.

The 'LS593 comes in a 20-pin package and has all the features of the 'LS592 plus 3-state I/O, which provides parallel counter outputs. The tables below show the operation of the enable (CCKEN,  $\overline{CCKEN}$ ) inputs. A register clock enable (RCKEN) is also provided.

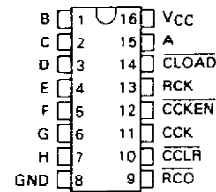
### OUTPUT ENABLE CONTROL ('593 ONLY)

| G | $\overline{G}$ | A/Q <sub>A</sub> thru H/Q <sub>H</sub> |
|---|----------------|----------------------------------------|
| L | L              | input mode                             |
| L | H              | input mode                             |
| H | L              | output mode                            |
| H | H              | input mode                             |

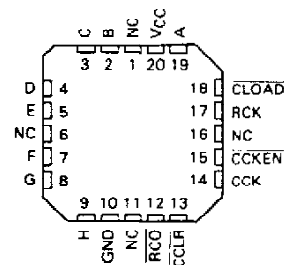
### COUNTER CLOCK ENABLE CONTROL

| CCKEN | $\overline{CCKEN}$ | EFFECT ON CCK |
|-------|--------------------|---------------|
| L     | L                  | Enable        |
| L     | H                  | Disable       |
| H     | L                  | Enable        |
| H     | H                  | Enable        |

### SN54LS592 . . . J OR W PACKAGE SN74LS592 . . . N PACKAGE (TOP VIEW)

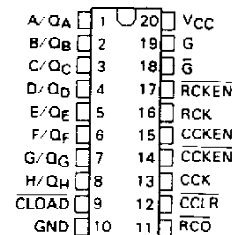


### SN54LS592 . . . FK PACKAGE (TOP VIEW)

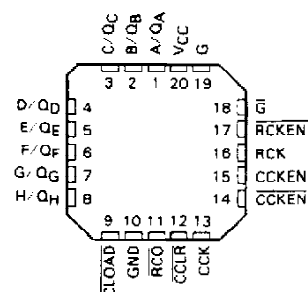


NC — No internal connection

### SN54LS593 . . . J OR W PACKAGE SN74LS593 . . . DW OR N PACKAGE (TOP VIEW)



### SN54LS593 . . . FK PACKAGE (TOP VIEW)



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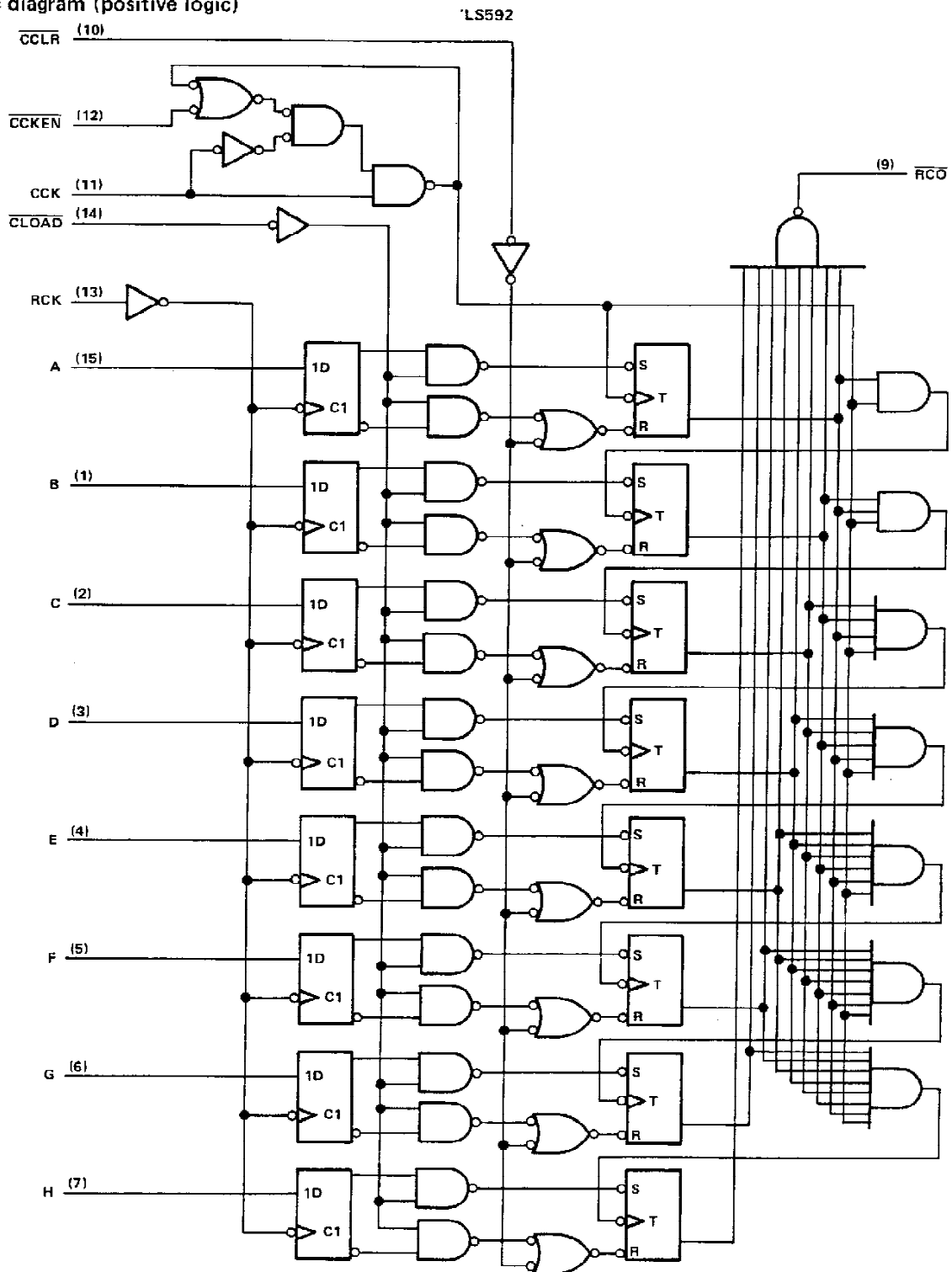
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# SN54LS592, SN74LS592 8-BIT BINARY COUNTERS WITH INPUT REGISTERS

logic diagram (positive logic)

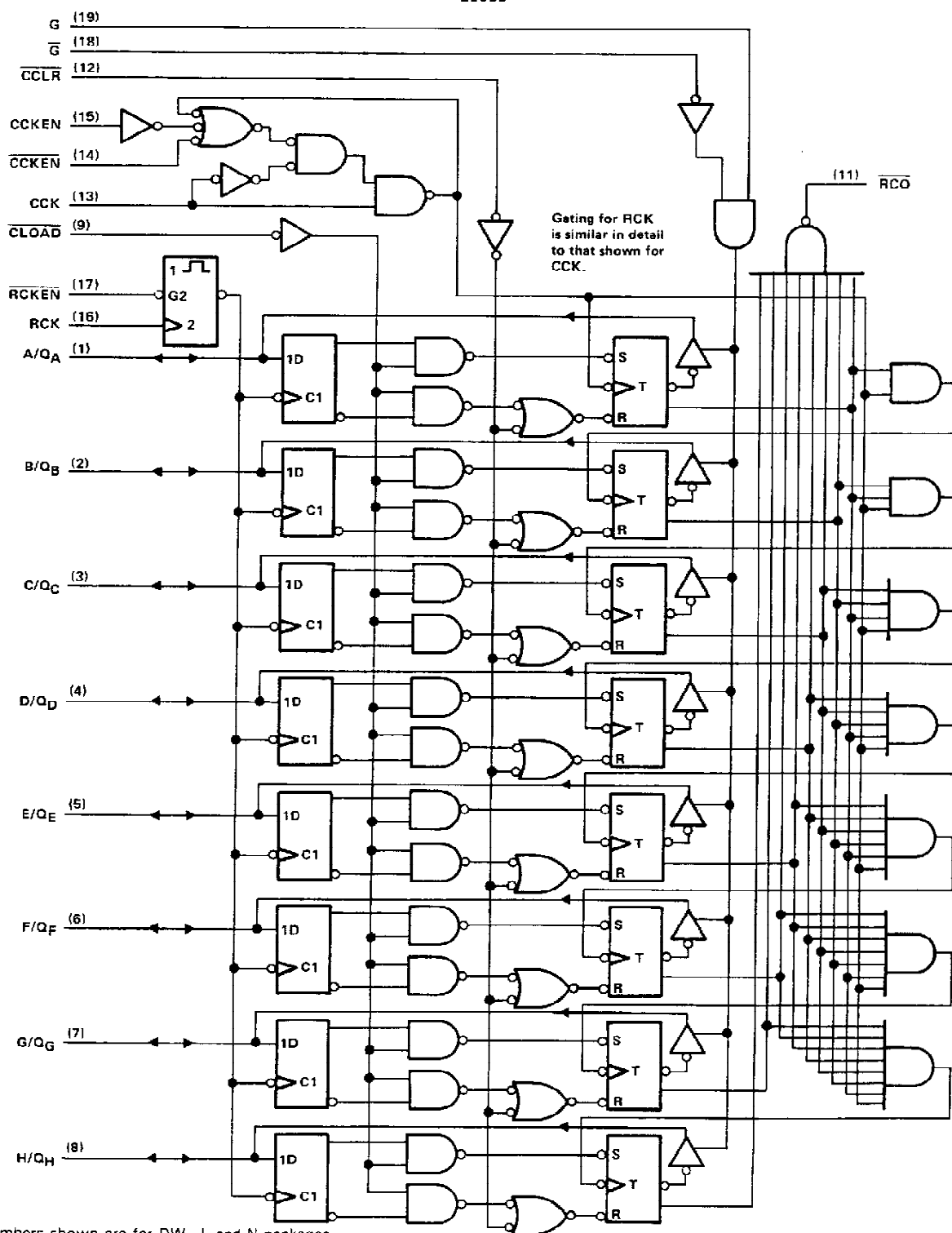


Pin numbers shown are for J, N, and W packages.

# **SN54LS593, SN74LS593** **8-BIT BINARY COUNTERS WITH INPUT REGISTERS**

logic diagram (positive logic)

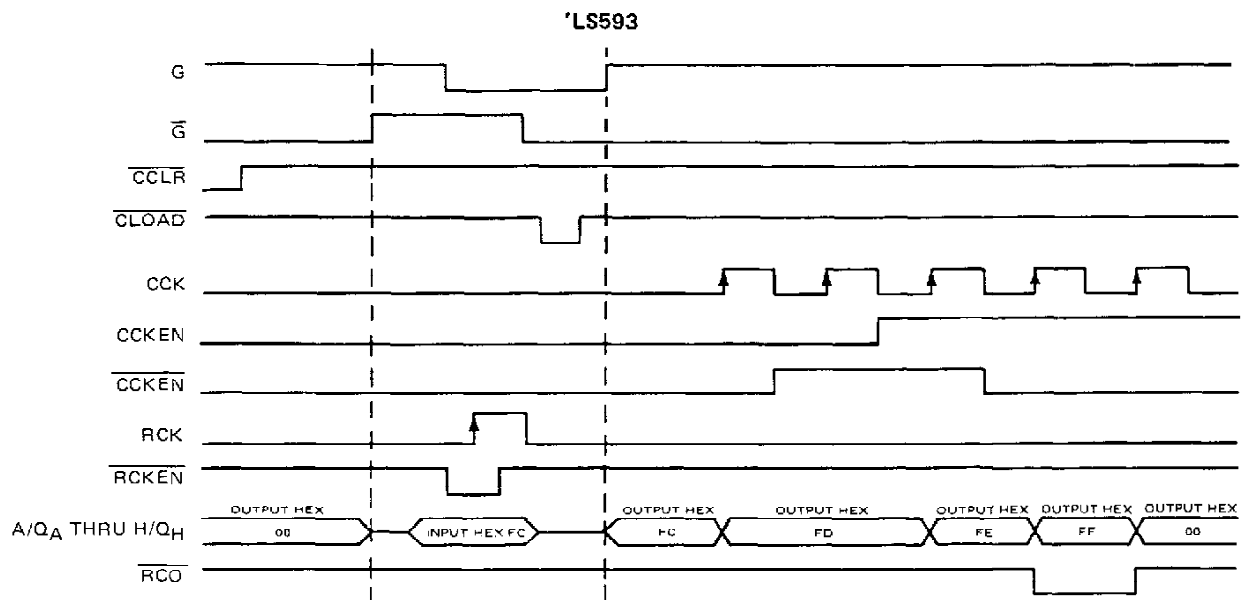
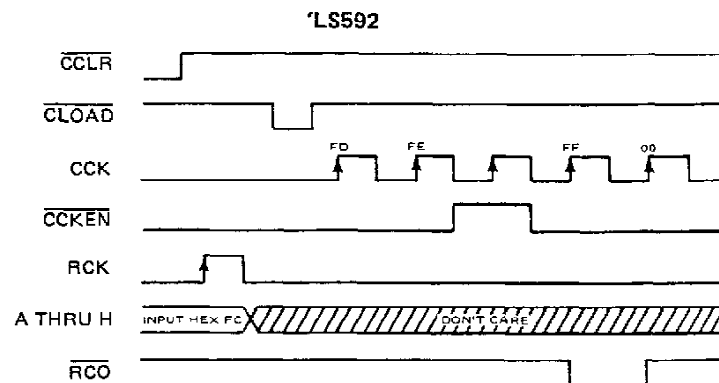
'LS593



Pin numbers shown are for DW, J, and N packages.

**SN54LS592, SN54LS593, SN74LS592, SN74LS593**  
**8-BIT BINARY COUNTERS WITH INPUT REGISTERS**

**typical operating sequences**



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# SN54LS592, SN54LS593, SN74LS592, SN74LS593

## 8-BIT BINARY COUNTERS WITH INPUT REGISTERS

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

|                                                            |                 |
|------------------------------------------------------------|-----------------|
| Supply voltage, $V_{CC}$ (see Note 1)                      | 7 V             |
| Input voltage (excluding I/O ports)                        | 7 V             |
| Off-state output voltage (including I/O ports)             | 5.5 V           |
| Operating free-air temperature range: SN54LS592, SN54LS593 | – 55°C to 125°C |
| SN74LS592, SN74LS593                                       | 0°C to 70°C     |
| Storage temperature range                                  | – 65°C to 150°C |

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

recommended operating conditions

|               |                                                            | SN54LS'                                                                   |     |     | SN74LS' |     |       | UNIT |
|---------------|------------------------------------------------------------|---------------------------------------------------------------------------|-----|-----|---------|-----|-------|------|
|               |                                                            | MIN                                                                       | NOM | MAX | MIN     | NOM | MAX   |      |
| $V_{CC}$      | Supply voltage                                             | 4.5                                                                       | 5   | 5.5 | 4.75    | 5   | 5.25  | V    |
| $V_{IH}$      | High-level input voltage                                   | 2                                                                         |     |     | 2       |     |       | V    |
| $V_{IL}$      | Low-level input voltage                                    |                                                                           |     | 0.7 |         |     | 0.8   | V    |
| $I_{OH}$      | High-level output current                                  | $\overline{RCO}$                                                          |     | – 1 |         |     | – 1   | mA   |
|               |                                                            | Q 'LS593 only                                                             |     | – 1 |         |     | – 2.6 |      |
| $I_{OL}$      | Low-level output current                                   | $\overline{RCO}$                                                          |     | 8   |         |     | 16    | mA   |
|               |                                                            | Q 'LS593 only                                                             |     | 12  |         |     | 24    |      |
| $f_{CLK}$     | Counter clock frequency                                    | 0                                                                         |     | 20  | 0       |     | 20    | MHz  |
| $t_w (CLK)$   | Duration of counter clock pulse                            | 25                                                                        |     |     | 25      |     |       | ns   |
| $t_w (CCLR)$  | Duration of counter clear pulse                            | 20                                                                        |     |     | 20      |     |       | ns   |
| $t_w (RCK)$   | Duration of register clock pulse                           | 20                                                                        |     |     | 20      |     |       | ns   |
| $t_w (CLOAD)$ | Duration of counter load pulse                             | 40                                                                        |     |     | 40      |     |       | ns   |
| $t_{su}$      | Register enable setup time                                 | $\overline{RCKEN}$ low to $\overline{RCK} \uparrow$ , 'LS593              |     | 20  |         |     | 20    | ns   |
| $t_{su}$      | Counter enable setup time before $\overline{CCK} \uparrow$ | $\overline{CCKEN}$ low, 'LS592                                            |     | 30  |         |     | 30    | ns   |
|               |                                                            | $\overline{CCKEN}$ low or                                                 |     |     |         |     |       |      |
|               |                                                            | $\overline{CCKEN}$ high, 'LS593                                           |     | 30  |         |     | 30    |      |
| $t_{su}$      | Setup time                                                 | $\overline{CCLR}$ inactive before $\overline{CCK} \uparrow$               |     | 20  |         |     | 20    | ns   |
|               |                                                            | $\overline{CLOAD}$ inactive before $\overline{CCK} \uparrow$              |     | 20  |         |     | 20    |      |
|               |                                                            | $\overline{RCK} \uparrow$ before $\overline{CLOAD} \uparrow$ (see Note 2) |     | 30  |         |     | 30    |      |
|               |                                                            | Data A thru H before $\overline{RCK} \uparrow$                            |     | 20  |         |     | 20    |      |
| $t_h$         | Hold time                                                  | Data A thru H after $\overline{RCK} \uparrow$                             |     | 0   |         |     | 0     | ns   |
|               |                                                            | All others                                                                |     | 0   |         |     | 0     |      |
| $T_A$         | Operating free-air temperature                             | – 55                                                                      |     | 125 | 0       |     | 70    | °C   |

NOTE 2: This time insures the data saved by  $\overline{RCK} \uparrow$  will also be loaded into the counter.



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# SN54LS592, SN54LS593, SN74LS592, SN74LS593 8-BIT BINARY COUNTERS WITH INPUT REGISTERS

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

| PARAMETER         |                                               |                                                                                             | TEST CONDITIONS†                               |       | SN54LS*  |      | SN74LS*  |     | UNIT |
|-------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------|-------|----------|------|----------|-----|------|
|                   |                                               |                                                                                             |                                                |       | MIN      | TYP‡ | MAX      | MIN |      |
| V <sub>IK</sub>   |                                               |                                                                                             | V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA |       | -1.5     |      | -1.5     |     | V    |
| V <sub>OH</sub>   | 'LS593 Q                                      | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX                         | I <sub>OH</sub> = -1 mA                        |       | 2.4 3.2  |      |          |     | V    |
|                   | I <sub>OH</sub> = -2.6 mA                     |                                                                                             |                                                |       | 2.4 3.1  |      |          |     |      |
| R <sub>CO</sub>   |                                               |                                                                                             | I <sub>OH</sub> = -1 mA                        |       | 2.4 3.2  |      | 2.4 3.2  |     |      |
| V <sub>OL</sub>   | 'LS593 Q                                      | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, 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> = 8 mA                        |                                                                                             | 0.25 0.4                                       |       | 0.25 0.4 |      |          |     |      |
|                   | I <sub>OL</sub> = 16 mA                       |                                                                                             |                                                |       | 0.35 0.5 |      |          |     |      |
| I <sub>OZH</sub>  | 'LS593 Q                                      | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>O</sub> = 2.7 V                        |                                                | 20    |          | 20   |          | μA  |      |
| I <sub>OZL</sub>  | 'LS593 Q                                      | V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, V <sub>O</sub> = 0.4 V |                                                | -0.4  |          | -0.4 |          | mA  |      |
| I <sub>I</sub>    | 'LS593 Q                                      | V <sub>CC</sub> = MAX                                                                       | V <sub>I</sub> = 5.5 V                         |       | 0.1      |      | 0.1      |     | mA   |
|                   | Others                                        |                                                                                             | V <sub>I</sub> = 7 V                           |       | 0.1      |      | 0.1      |     |      |
| I <sub>IH</sub>   | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V |                                                                                             | 20                                             |       | 20       |      | μA       |     |      |
| I <sub>IL</sub>   | CCK                                           |                                                                                             | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V  |       | -0.8     |      | -0.8     |     | mA   |
|                   | RCK                                           | 'LS592                                                                                      |                                                |       | -0.2     |      | -0.2     |     |      |
|                   |                                               | 'LS593                                                                                      |                                                |       | -0.8     |      | -0.8     |     |      |
|                   | A thru H                                      |                                                                                             |                                                |       | -0.4     |      | -0.4     |     |      |
|                   | Others                                        |                                                                                             |                                                |       | -0.2     |      | -0.2     |     |      |
| I <sub>OS</sub> § | 'LS593 Q                                      | V <sub>CC</sub> = MAX, V <sub>O</sub> = 0 V                                                 | -30 -130                                       |       | -30 -130 |      | mA       |     |      |
|                   | R <sub>CO</sub>                               |                                                                                             | -20 -100                                       |       | -20 -100 |      |          |     |      |
| I <sub>CC</sub>   | 'LS592                                        | V <sub>CC</sub> = MAX, All possible inputs grounded, All outputs open                       | I <sub>CCH</sub>                               | 40 60 | 40 60    | mA   |          |     |      |
|                   |                                               |                                                                                             | I <sub>CCL</sub>                               | 40 60 | 40 60    |      |          |     |      |
|                   | 'LS593                                        |                                                                                             | I <sub>CCH</sub>                               | 47 70 | 47 70    |      |          |     |      |
|                   |                                               |                                                                                             | I <sub>CCL</sub>                               | 53 80 | 53 80    |      |          |     |      |
|                   |                                               |                                                                                             | I <sub>CCZ</sub>                               | 57 85 | 57 85    |      |          |     |      |

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

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

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

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**SN54LS592, SN54LS593, SN74LS592, SN74LS593**  
**8-BIT BINARY COUNTERS WITH INPUT REGISTERS**

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , (see note 3)

| PARAMETER        | FROM<br>(INPUT)                      | TO<br>(OUTPUT)          | TEST CONDITIONS                                 | LS592 |     |     | LS593 |     |     | UNIT |
|------------------|--------------------------------------|-------------------------|-------------------------------------------------|-------|-----|-----|-------|-----|-----|------|
|                  |                                      |                         |                                                 | MIN   | TYP | MAX | MIN   | TYP | MAX |      |
| $f_{\max}$       | CCK                                  | $\overline{\text{RCO}}$ | $R_L = 1\text{ k}\Omega$ , $C_L = 30\text{ pF}$ | 20    | 35  |     | 20    | 35  |     | MHz  |
| $t_{\text{PLH}}$ | CCK $\uparrow$                       | Q                       | $R_L = 667\ \Omega$ , $C_L = 45\text{ pF}$      |       |     |     | 14    | 21  |     | ns   |
| $t_{\text{PHL}}$ | CCK $\downarrow$                     | Q                       |                                                 |       |     |     | 26    | 39  |     | ns   |
| $t_{\text{PLH}}$ | $\overline{\text{CLOAD}} \downarrow$ | Q                       |                                                 |       |     |     | 34    | 51  |     | ns   |
| $t_{\text{PHL}}$ | $\overline{\text{CLOAD}} \uparrow$   | Q                       |                                                 |       |     |     | 28    | 42  |     | ns   |
| $t_{\text{PHL}}$ | $\overline{\text{CCLR}} \downarrow$  | Q                       |                                                 |       |     |     | 25    | 38  |     | ns   |
| $t_{\text{PZH}}$ | G $\uparrow$                         | Q                       |                                                 |       |     |     | 31    | 47  |     | ns   |
| $t_{\text{PZL}}$ | G $\downarrow$                       | Q                       |                                                 |       |     |     | 27    | 40  |     | ns   |
| $t_{\text{PZH}}$ | $\overline{\text{G}} \downarrow$     | Q                       |                                                 |       |     |     | 29    | 45  |     | ns   |
| $t_{\text{PZL}}$ | $\overline{\text{G}} \uparrow$       | Q                       |                                                 |       |     |     | 31    | 47  |     | ns   |
| $t_{\text{PHZ}}$ | G $\downarrow$                       | Q                       |                                                 |       |     |     | 33    | 50  |     | ns   |
| $t_{\text{PLZ}}$ | G $\downarrow$                       | Q                       | $R_L = 667\ \Omega$ , $C_L = 5\text{ pF}$       |       |     |     | 35    | 52  |     | ns   |
| $t_{\text{PHZ}}$ | $\overline{\text{G}} \uparrow$       | Q                       |                                                 |       |     |     | 26    | 39  |     | ns   |
| $t_{\text{PLZ}}$ | $\overline{\text{G}} \uparrow$       | Q                       |                                                 |       |     |     | 28    | 42  |     | ns   |
| $t_{\text{PLH}}$ | CCK $\uparrow$                       | $\overline{\text{RCO}}$ |                                                 |       |     |     |       |     |     |      |
| $t_{\text{PHL}}$ | CCK $\downarrow$                     | $\overline{\text{RCO}}$ | $R_L = 1\text{ k}\Omega$ , $C_L = 30\text{ pF}$ | 15    | 23  |     | 14    | 21  |     | ns   |
| $t_{\text{PLH}}$ | $\overline{\text{CLOAD}} \downarrow$ | $\overline{\text{RCO}}$ |                                                 | 20    | 30  |     | 20    | 30  |     | ns   |
| $t_{\text{PHL}}$ | $\overline{\text{CLOAD}} \uparrow$   | $\overline{\text{RCO}}$ |                                                 | 31    | 47  |     | 31    | 47  |     | ns   |
| $t_{\text{PLH}}$ | $\overline{\text{CCLR}} \downarrow$  | $\overline{\text{RCO}}$ |                                                 | 27    | 41  |     | 27    | 41  |     | ns   |
| $t_{\text{PHL}}$ | $\overline{\text{CCLR}} \uparrow$    | $\overline{\text{RCO}}$ |                                                 | 30    | 45  |     | 30    | 45  |     | ns   |
| $t_{\text{PLH}}$ | RCK $\uparrow$                       | $\overline{\text{RCO}}$ | $R_L = 1\text{ k}\Omega$ ; $C_L = 30\text{ pF}$ | 35    | 53  |     | 42    | 63  |     | ns   |
| $t_{\text{PHL}}$ | RCK $\downarrow$                     | $\overline{\text{RCO}}$ | $\overline{\text{CLOAD}} = L$                   | 30    | 45  |     | 33    | 50  |     | ns   |

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



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**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)                | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|----------------------------------------|-------------------------|
| 5962-87621012A   | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | 5962-<br>87621012A<br>SNJ54LS<br>592FK | <a href="#">Samples</a> |
| 5962-8762101EA   | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101EA<br>SNJ54LS592J          | <a href="#">Samples</a> |
| 5962-8762101EA   | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101EA<br>SNJ54LS592J          | <a href="#">Samples</a> |
| 5962-8762101FA   | ACTIVE        | CFP          | W                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101FA<br>SNJ54LS592W          | <a href="#">Samples</a> |
| 5962-8762101FA   | ACTIVE        | CFP          | W                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101FA<br>SNJ54LS592W          | <a href="#">Samples</a> |
| SN54LS592J       | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | SN54LS592J                             | <a href="#">Samples</a> |
| SN54LS592J       | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | SN54LS592J                             | <a href="#">Samples</a> |
| SN54LS593J       | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | SN54LS593J                             | <a href="#">Samples</a> |
| SN54LS593J       | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD                        | A42                     | N / A for Pkg Type   | -55 to 125   | SN54LS593J                             | <a href="#">Samples</a> |
| SN74LS592D       | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592D       | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592DE4     | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592DE4     | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592DG4     | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592DG4     | ACTIVE        | SOIC         | D                  | 16   | 40             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS592                                  | <a href="#">Samples</a> |
| SN74LS592DR      | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      | LS592                                  |                         |
| SN74LS592DR      | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      | LS592                                  |                         |
| SN74LS592DRE4    | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)                | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|----------------------------------------|-------------------------|
| SN74LS592DRE4    | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS592DRG4    | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS592DRG4    | OBSOLETE      | SOIC         | D                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS592N       | ACTIVE        | PDIP         | N                  | 16   | 25             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN74LS592N                             | <a href="#">Samples</a> |
| SN74LS592N       | ACTIVE        | PDIP         | N                  | 16   | 25             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN74LS592N                             | <a href="#">Samples</a> |
| SN74LS592N3      | OBSOLETE      | PDIP         | N                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS592N3      | OBSOLETE      | PDIP         | N                  | 16   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS592NSR     | ACTIVE        | SO           | NS                 | 16   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 74LS592                                | <a href="#">Samples</a> |
| SN74LS592NSR     | ACTIVE        | SO           | NS                 | 16   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | 74LS592                                | <a href="#">Samples</a> |
| SN74LS593DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS593                                  | <a href="#">Samples</a> |
| SN74LS593DW      | ACTIVE        | SOIC         | DW                 | 20   | 25             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS593                                  | <a href="#">Samples</a> |
| SN74LS593DWR     | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS593                                  | <a href="#">Samples</a> |
| SN74LS593DWR     | ACTIVE        | SOIC         | DW                 | 20   | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU               | Level-1-260C-UNLIM   | 0 to 70      | LS593                                  | <a href="#">Samples</a> |
| SN74LS593N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN74LS593N                             | <a href="#">Samples</a> |
| SN74LS593N       | ACTIVE        | PDIP         | N                  | 20   | 20             | Pb-Free<br>(RoHS)          | CU NIPDAU               | N / A for Pkg Type   | 0 to 70      | SN74LS593N                             | <a href="#">Samples</a> |
| SN74LS593N3      | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SN74LS593N3      | OBSOLETE      | PDIP         | N                  | 20   |                | TBD                        | Call TI                 | Call TI              | 0 to 70      |                                        |                         |
| SNJ54LS592FK     | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | 5962-<br>87621012A<br>SNJ54LS<br>592FK | <a href="#">Samples</a> |
| SNJ54LS592FK     | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | 5962-<br>87621012A<br>SNJ54LS<br>592FK | <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<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)       | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|-----------------|-------------------------|----------------------|--------------|-------------------------------|-------------------------|
| SNJ54LS592J      | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101EA<br>SNJ54LS592J | <a href="#">Samples</a> |
| SNJ54LS592J      | ACTIVE        | CDIP         | J                  | 16   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101EA<br>SNJ54LS592J | <a href="#">Samples</a> |
| SNJ54LS592W      | ACTIVE        | CFP          | W                  | 16   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101FA<br>SNJ54LS592W | <a href="#">Samples</a> |
| SNJ54LS592W      | ACTIVE        | CFP          | W                  | 16   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | 5962-8762101FA<br>SNJ54LS592W | <a href="#">Samples</a> |
| SNJ54LS593FK     | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD             | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | SNJ54LS<br>593FK              | <a href="#">Samples</a> |
| SNJ54LS593FK     | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD             | POST-PLATE              | N / A for Pkg Type   | -55 to 125   | SNJ54LS<br>593FK              | <a href="#">Samples</a> |
| SNJ54LS593J      | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | SNJ54LS593J                   | <a href="#">Samples</a> |
| SNJ54LS593J      | ACTIVE        | CDIP         | J                  | 20   | 1              | TBD             | A42                     | N / A for Pkg Type   | -55 to 125   | SNJ54LS593J                   | <a href="#">Samples</a> |
| SNJ54LS593W      | OBSOLETE      |              |                    | 20   |                | TBD             | Call TI                 | Call TI              | -55 to 125   |                               |                         |
| SNJ54LS593W      | OBSOLETE      |              |                    | 20   |                | TBD             | Call TI                 | Call TI              | -55 to 125   |                               |                         |

<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.

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

<sup>(5)</sup> 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.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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**OTHER QUALIFIED VERSIONS OF SN54LS592, SN54LS593, SN74LS592, SN74LS593 :**

- Catalog: [SN74LS592](#), [SN74LS593](#)

- Military: [SN54LS592](#), [SN54LS593](#)

**NOTE: Qualified Version Definitions:**

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

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


|    |                                                           |
|----|-----------------------------------------------------------|
| A0 | Dimension designed to accommodate the component width     |
| B0 | Dimension designed to accommodate the component length    |
| K0 | Dimension designed to accommodate the component thickness |
| W  | Overall width of the carrier tape                         |
| P1 | Pitch between successive cavity centers                   |

**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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LS592NSR | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| SN74LS593DWR | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.0    | 2.7     | 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) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LS592NSR | SO           | NS              | 16   | 2000 | 367.0       | 367.0      | 38.0        |
| SN74LS593DWR | SOIC         | DW              | 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)        |

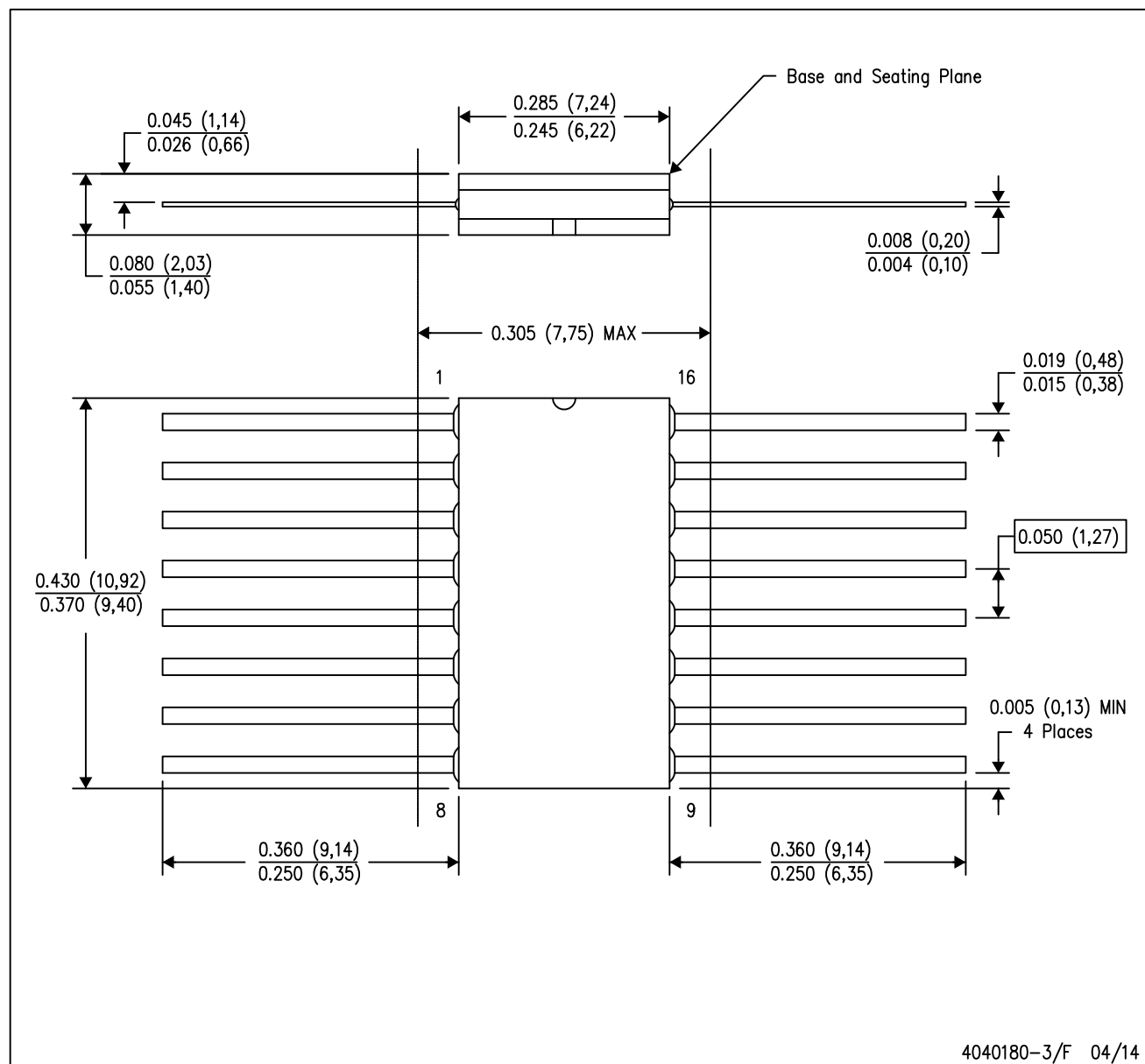


4040083/F 03/03

- 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-F16)

CERAMIC DUAL FLATPACK



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP2-F16

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)  |



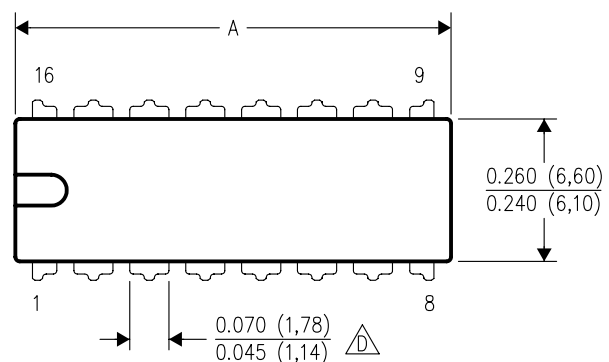
4040140/D 01/11

- 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

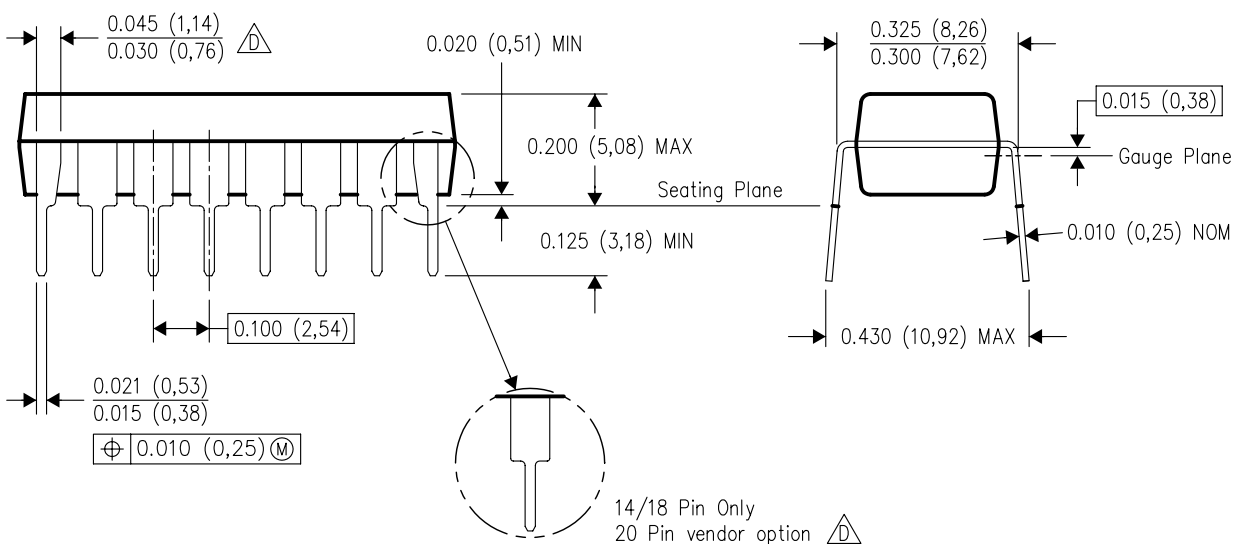
N (R-PDIP-T\*\*)

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               |

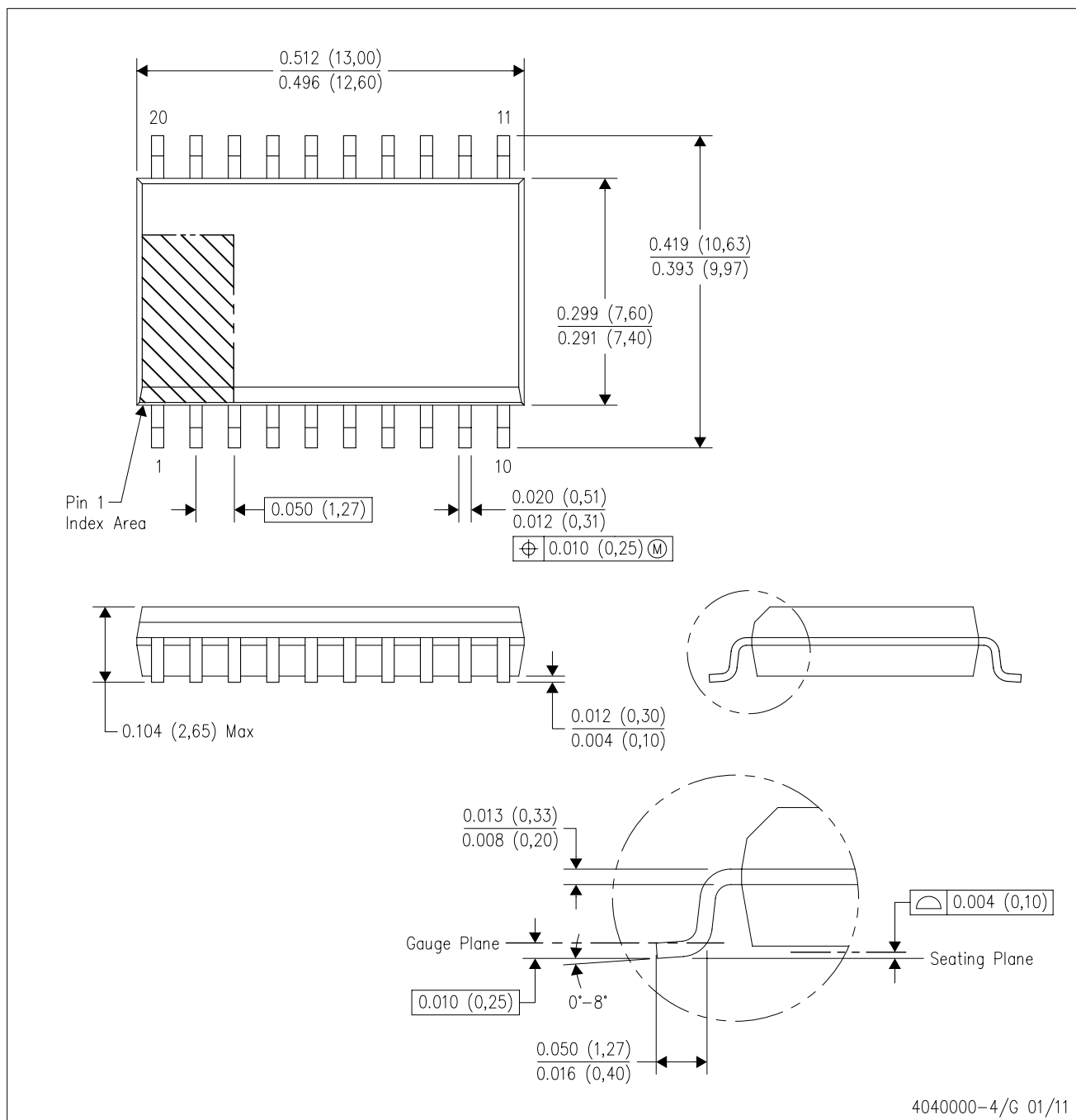


4040049/E 12/2002

- 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.

DW (R-PDSO-G20)

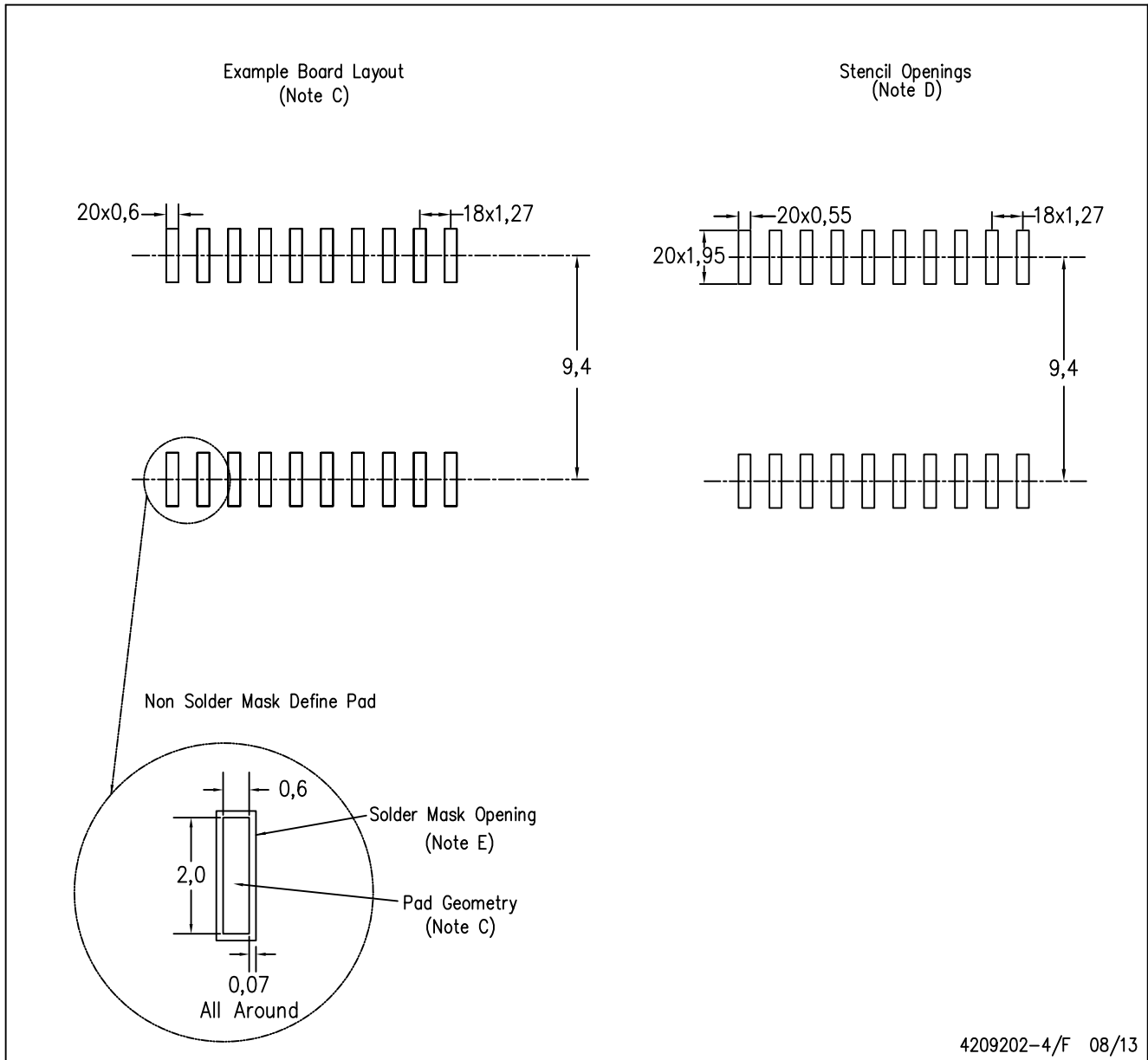
# PLASTIC SMALL OUTLINE



- 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:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Refer to IPC7351 for alternate board design.
  - 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
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4040047-6/M 06/11

- 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.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



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

# 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.

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