

# CD4518B, CD4520B Types

## CMOS Dual Up-Counters

High-Voltage Types (20-Volt Rating)

CD4518B Dual BCD Up-Counter  
CD4520B Dual Binary Up-Counter

■ CD4518 Dual BCD Up-Counter and CD4520 Dual Binary Up-Counter each consist of two identical, internally synchronous 4-stage counters. The counter stages are D-type flip-flops having interchangeable CLOCK and ENABLE lines for incrementing on either the positive-going or negative-going transition. For single-unit operation the ENABLE input is maintained high and the counter advances on each positive-going transition of the CLOCK. The counters are cleared by high levels on their RESET lines.

The counter can be cascaded in the ripple mode by connecting Q4 to the enable input of the subsequent counter while the CLOCK input of the latter is held low.

The CD4518B and CD4520B types are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffix), 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline packages (M, M96, and NSR suffixes), and 16-lead thin shrink small-outline packages (PW and PWR suffixes).

### MAXIMUM RATINGS, Absolute-Maximum Values:

#### DC SUPPLY-VOLTAGE RANGE, ( $V_{DD}$ )

Voltages referenced to  $V_{SS}$  Terminal) ..... -0.5V to +20V

INPUT VOLTAGE RANGE, ALL INPUTS ..... -0.5V to  $V_{DD} + 0.5V$

DC INPUT CURRENT, ANY ONE INPUT .....  $\pm 10\text{mA}$

#### POWER DISSIPATION PER PACKAGE ( $P_D$ ):

For  $T_A = -55^\circ\text{C}$  to  $+100^\circ\text{C}$  ..... 500mW

For  $T_A = +100^\circ\text{C}$  to  $+125^\circ\text{C}$  ..... Derate Linearity at 12mW/ $^\circ\text{C}$  to 200mW

#### DEVICE DISSIPATION PER OUTPUT TRANSISTOR

FOR  $T_A = \text{FULL PACKAGE-TEMPERATURE RANGE (All Package Types)}$  ..... 100mW

OPERATING-TEMPERATURE RANGE ( $T_A$ ) .....  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$

STORAGE TEMPERATURE RANGE ( $T_{stg}$ ) .....  $-65^\circ\text{C}$  to  $+150^\circ\text{C}$

#### LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16  $\pm$  1/32 inch (1.59  $\pm$  0.79mm) from case for 10s max .....  $+265^\circ\text{C}$

### Features:

- Medium-speed operation –  
6-MHz typical clock frequency at 10 V.
- Positive- or negative-edge triggering
- Synchronous internal carry propagation
- 100% tested for quiescent current at 20 V
- Maximum input current of 1  $\mu\text{A}$  at 18 V  
over full package-temperature range;  
100 nA at 18 V and  $25^\circ\text{C}$
- Noise margin (over full package-temperature range): 1 V at  $V_{DD} = 5\text{V}$   
2 V at  $V_{DD} = 10\text{V}$   
2.5 V at  $V_{DD} = 15\text{V}$
- 5-V, 10-V, and 15-V parametric ratings
- Standardized, symmetrical output characteristics
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"



### Applications:

- Multistage synchronous counting
- Multistage ripple counting
- Frequency dividers

### TRUTH TABLE

| CLOCK | ENABLE | RESET | ACTION            |
|-------|--------|-------|-------------------|
|       | 1      | 0     | Increment Counter |
| 0     |        | 0     | Increment Counter |
|       | X      | 0     | No Change         |
| X     |        | 0     | No Change         |
|       | 0      | 0     | No Change         |
| 1     |        | 0     | No Change         |
| X     | X      | 1     | Q1 thru Q4 = 0    |

X = Don't Care    1  $\equiv$  High State    0  $\equiv$  Low State



### CD4518B, CD4520B TERMINAL ASSIGNMENT



Fig. 1 – Typical output low (sink) current characteristics.

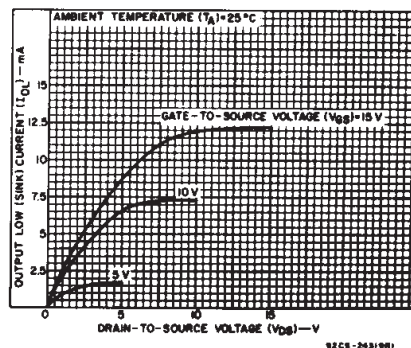


Fig. 2 – Minimum output low (sink) current characteristics.



Fig. 3 – Typical output high (source) current characteristics.

# CD4518B, CD4520B Types

## STATIC ELECTRICAL CHARACTERISTICS

| CHARACTER-<br>ISTIC                                         | CONDITIONS            |                        |                        | LIMITS AT INDICATED TEMPERATURES (°C) |       |       |       |       |                   |      | UNITS |
|-------------------------------------------------------------|-----------------------|------------------------|------------------------|---------------------------------------|-------|-------|-------|-------|-------------------|------|-------|
|                                                             | V <sub>O</sub><br>(V) | V <sub>IN</sub><br>(V) | V <sub>DD</sub><br>(V) |                                       |       |       |       | +25   |                   |      |       |
|                                                             |                       |                        |                        | -55                                   | -40   | +85   | +125  | Min.  | Typ.              | Max. |       |
| Quiescent Device<br>Current,<br>I <sub>DD</sub> Max.        | —                     | 0,5                    | 5                      | 5                                     | 5     | 150   | 150   | —     | 0.04              | 5    | μA    |
|                                                             | —                     | 0,10                   | 10                     | 10                                    | 10    | 300   | 300   | —     | 0.04              | 10   |       |
|                                                             | —                     | 0,15                   | 15                     | 20                                    | 20    | 600   | 600   | —     | 0.04              | 20   |       |
|                                                             | —                     | 0,20                   | 20                     | 100                                   | 100   | 3000  | 3000  | —     | 0.08              | 100  |       |
| Output Low<br>(Sink) Current<br>I <sub>OL</sub> Min.        | 0.4                   | 0,5                    | 5                      | 0.64                                  | 0.61  | 0.42  | 0.36  | 0.51  | 1                 | —    | mA    |
|                                                             | 0.5                   | 0,10                   | 10                     | 1.6                                   | 1.5   | 1.1   | 0.9   | 1.3   | 2.6               | —    |       |
|                                                             | 1.5                   | 0,15                   | 15                     | 4.2                                   | 4     | 2.8   | 2.4   | 3.4   | 6.8               | —    |       |
| Output High<br>(Source)<br>Current,<br>I <sub>OH</sub> Min. | 4.6                   | 0,5                    | 5                      | -0.64                                 | -0.61 | -0.42 | -0.36 | -0.51 | -1                | —    | mA    |
|                                                             | 2.5                   | 0,5                    | 5                      | -2                                    | -1.8  | -1.3  | -1.15 | -1.6  | -3.2              | —    |       |
|                                                             | 9.5                   | 0,10                   | 10                     | -1.6                                  | -1.5  | -1.1  | -0.9  | -1.3  | -2.6              | —    |       |
|                                                             | 13.5                  | 0,15                   | 15                     | -4.2                                  | -4    | -2.8  | -2.4  | -3.4  | -6.8              | —    |       |
| Output Voltage:<br>Low-Level,<br>V <sub>OL</sub> Max.       | —                     | 0,5                    | 5                      | 0.05                                  |       |       |       | —     | 0                 | 0.05 | V     |
|                                                             | —                     | 0,10                   | 10                     | 0.05                                  |       |       |       | —     | 0                 | 0.05 |       |
|                                                             | —                     | 0,15                   | 15                     | 0.05                                  |       |       |       | —     | 0                 | 0.05 |       |
| Output Voltage:<br>High-Level,<br>V <sub>OH</sub> Min.      | —                     | 0,5                    | 5                      | 4.95                                  |       |       |       | 4.95  | 5                 | —    | V     |
|                                                             | —                     | 0,10                   | 10                     | 9.95                                  |       |       |       | 9.95  | 10                | —    |       |
|                                                             | —                     | 0,15                   | 15                     | 14.95                                 |       |       |       | 14.95 | 15                | —    |       |
| Input Low<br>Voltage,<br>V <sub>IL</sub> Max.               | 0.5, 4.5              | —                      | 5                      | 1.5                                   |       |       |       | —     | —                 | 1.5  | V     |
|                                                             | 1, 9                  | —                      | 10                     | 3                                     |       |       |       | —     | —                 | 3    |       |
|                                                             | 1.5, 13.5             | —                      | 15                     | 4                                     |       |       |       | —     | —                 | 4    |       |
| Input High<br>Voltage,<br>V <sub>IH</sub> Min.              | 0.5, 4.5              | —                      | 5                      | 3.5                                   |       |       |       | 3.5   | —                 | —    | V     |
|                                                             | 1, 9                  | —                      | 10                     | 7                                     |       |       |       | 7     | —                 | —    |       |
|                                                             | 1.5, 13.5             | —                      | 15                     | 11                                    |       |       |       | 11    | —                 | —    |       |
| Input Current<br>I <sub>IN</sub> Max.                       | —                     | 0,18                   | 18                     | ±0.1                                  | ±0.1  | ±1    | ±1    | —     | ±10 <sup>-5</sup> | ±0.1 | μA    |

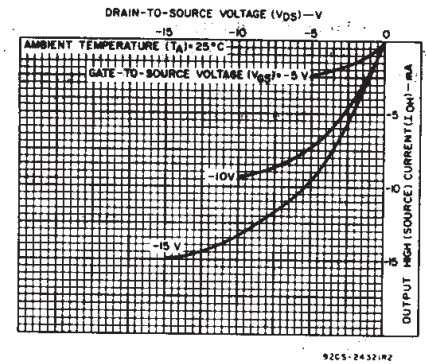


Fig. 4 — Minimum output high (source) current characteristics.

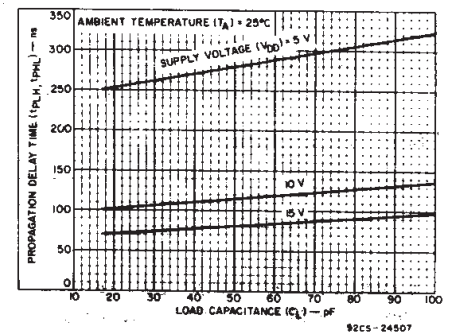


Fig. 5 — Typical propagation delay vs. load capacitance, clock or enable to output.



Fig. 6 — Typical propagation delay time vs. load capacitance, reset to output.



Fig. 7 — Typical transition time vs. load capacitance.

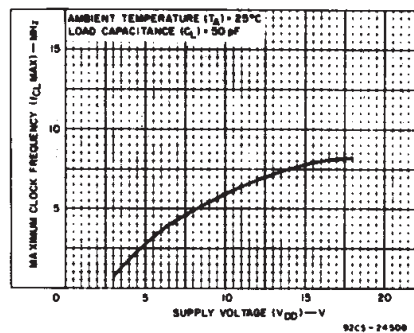


Fig. 8 — Typical maximum-clock-frequency vs. supply voltage.

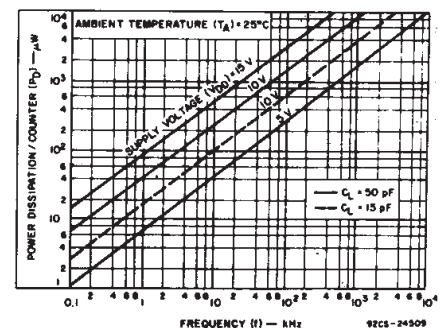


Fig. 9 — Typical power dissipation characteristics.

### CD4518B, CD4520B Types

**RECOMMENDED OPERATING CONDITIONS at  $T_A = 25^\circ\text{C}$ , Except as Noted.**  
For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

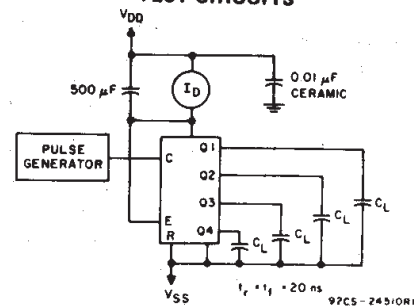
| CHARACTERISTIC                                                            | V <sub>DD</sub><br>(V) | LIMITS |      | UNITS |
|---------------------------------------------------------------------------|------------------------|--------|------|-------|
|                                                                           |                        | Min.   | Max. |       |
| Supply-Voltage Range (For T <sub>A</sub> =Full Package-Temperature Range) |                        | 3      | 18   | V     |
| Enable Pulse Width, t <sub>W</sub>                                        | 5                      | 400    | —    | ns    |
|                                                                           | 10                     | 200    | —    |       |
|                                                                           | 15                     | 140    | —    |       |
| Clock Pulse Width, t <sub>W</sub>                                         | 5                      | 200    | —    | ns    |
|                                                                           | 10                     | 100    | —    |       |
|                                                                           | 15                     | 70     | —    |       |
| Clock Input Frequency, f <sub>CL</sub>                                    | 5                      |        | 1.5  | MHz   |
|                                                                           | 10                     | dc     | 3    |       |
|                                                                           | 15                     |        | 4    |       |
| Clock Rise or Fall Time, t <sub>rCL</sub> or t <sub>fCL</sub> :           | 5                      |        | 15   | μs    |
|                                                                           | 10                     | —      | 5    |       |
|                                                                           | 15                     | —      | 5    |       |
| Reset Pulse Width, t <sub>W</sub>                                         | 5                      | 250    | —    | ns    |
|                                                                           | 10                     | 110    | —    |       |
|                                                                           | 15                     | 80     | —    |       |

**DYNAMIC ELECTRICAL CHARACTERISTICS at  $T_A = 25^\circ\text{C}$ :**

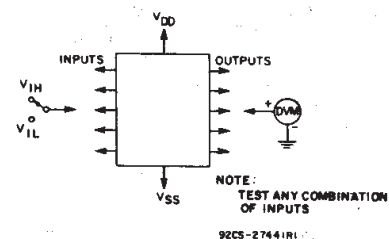
Input  $t_r, t_f = 20$  ns,  $C_1 = 50$  pF,  $R_1 = 200$  K $\Omega$

| CHARACTERISTIC                                                               | TEST CONDITIONS | LIMITS        |               |                  | UNITS             |         |
|------------------------------------------------------------------------------|-----------------|---------------|---------------|------------------|-------------------|---------|
|                                                                              |                 | $V_{DD}$<br>V | Min.          | Typ.             |                   | Max.    |
| Propagation Delay Time, $t_{PHL}$ , $t_{PLH}$ :<br>Clock or Enable to Output |                 | 5<br>10<br>15 | —<br>—<br>—   | 280<br>115<br>80 | 560<br>230<br>160 | ns      |
| Reset to Output                                                              |                 | 5<br>10<br>15 | —<br>—<br>—   | 330<br>130<br>90 | 650<br>225<br>170 |         |
| Transition Time, $t_{THL}$ , $t_{TLH}$                                       |                 | 5<br>10<br>15 | —<br>—<br>—   | 100<br>50<br>40  | 200<br>100<br>80  |         |
| Maximum Clock Input Frequency, $f_{CL}$                                      |                 | 5<br>10<br>15 | 1.5<br>3<br>4 | 3<br>6<br>8      | —<br>—<br>—       | MHz     |
| Minimum Clock Pulse Width, $t_W$                                             |                 | 5<br>10<br>15 |               | 100<br>50<br>35  | 200<br>100<br>70  | ns      |
| Clock Rise or Fall Time, $t_r$ or $t_f$ :                                    |                 | 5<br>10, 15   | —<br>—        | —<br>—           | 15<br>5           | $\mu$ s |
| Minimum Reset Pulse Width, $t_W$                                             |                 | 5<br>10<br>15 | —<br>—<br>—   | 125<br>55<br>40  | 250<br>110<br>80  | ns      |
| Minimum Enable Pulse Width, $t_W$                                            |                 | 5<br>10<br>15 | —<br>—<br>—   | 200<br>100<br>70 | 400<br>200<br>140 | ns      |
| Input Capacitance, $C_{IN}$                                                  | Any Input       |               |               | 5                | 7.5               | pF      |

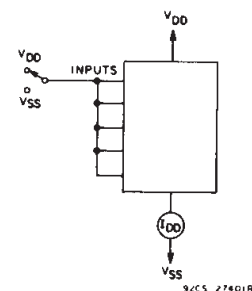
## TEST CIRCUITS



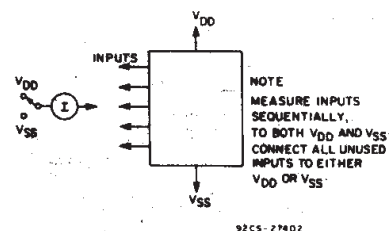
**Fig. 10 — Dynamic power dissipation.**



**Fig. 11 — Input voltage.**



**Fig. 12 — Quiescent device current test circuit.**



**Fig. 13 — Input leakage-current test circuit.**

## CD4518B, CD4520B Types



Fig. 14 — Decade counter (CD4518B) logic diagram for one of two identical counters.

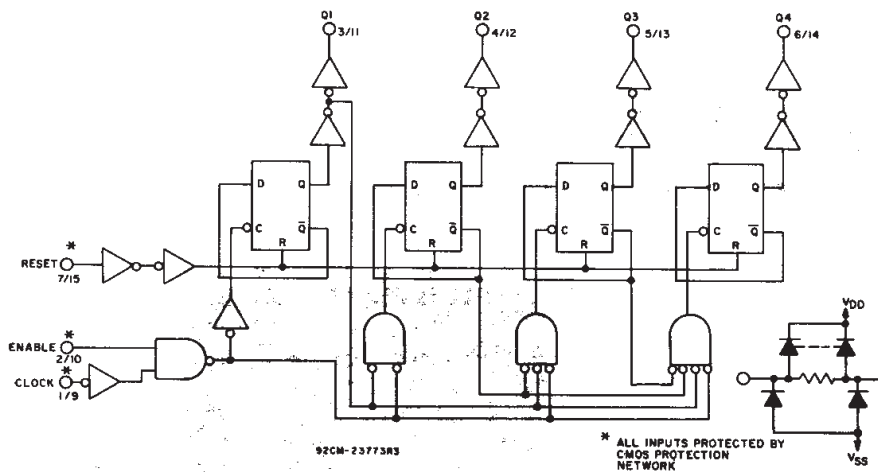


Fig. 15 — Binary counter (CD4520B) logic diagram for one of two identical counters.



Fig. 16 — Timing diagrams for CD4518B and CD4520B.

## CD4518B, CD4520B Types



Fig. 17 - Ripple cascading of four counters with positive edge triggering.

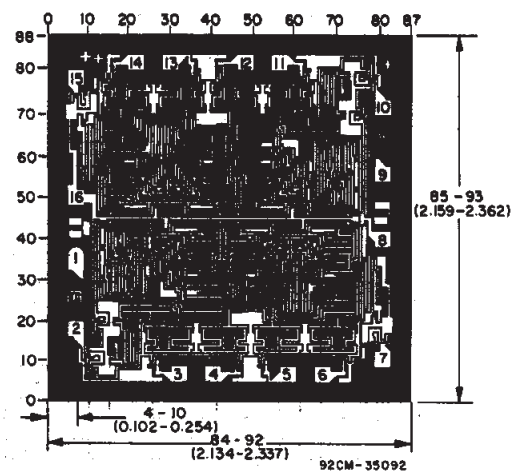


\*NOTE:  
FOR SYNCHRONOUS CASCADING, THE CLOCK TRANSITION TIME SHOULD BE MADE LESS THAN OR EQUAL TO THE SUM OF THE FIXED PROPAGATION DELAY AT 15 pF AND THE TRANSITION TIME OF THE OUTPUT DRIVER STAGE FOR THE ESTIMATED CAPACITATIVE LOAD.

Fig. 18 - Synchronous cascading of four binary counters with negative edge triggering.



Dimensions and pad layout for CD4518BH chip.



Dimensions and pad layout for CD4520BH chip.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils ( $10^{-3}$  inch).

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|-------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| 7702301EA        | ACTIVE        | CDIP         | J                  | 16   | 1           | TBD                        | Call TI          | Call TI              | -55 to 125   | 7702301EA<br>CD4520BF3A  | <a href="#">Samples</a> |
| CD4518BE         | ACTIVE        | PDIP         | N                  | 16   | 25          | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -55 to 125   | CD4518BE                 | <a href="#">Samples</a> |
| CD4518BEE4       | ACTIVE        | PDIP         | N                  | 16   | 25          | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -55 to 125   | CD4518BE                 | <a href="#">Samples</a> |
| CD4518BF         | ACTIVE        | CDIP         | J                  | 16   | 1           | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | CD4518BF                 | <a href="#">Samples</a> |
| CD4518BF3A       | ACTIVE        | CDIP         | J                  | 16   | 1           | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | CD4518BF3A               | <a href="#">Samples</a> |
| CD4518BM         | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BM96       | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BM96E4     | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BM96G4     | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BME4       | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BMG4       | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518BM                 | <a href="#">Samples</a> |
| CD4518BNSR       | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518B                  | <a href="#">Samples</a> |
| CD4518BNSRE4     | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518B                  | <a href="#">Samples</a> |
| CD4518BNSRG4     | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4518B                  | <a href="#">Samples</a> |
| CD4518BPW        | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |
| CD4518BPWE4      | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |
| CD4518BPWG4      | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|-------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| CD4518BPWR       | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |
| CD4518BPWRE4     | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |
| CD4518BPWRG4     | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM518B                   | <a href="#">Samples</a> |
| CD4520BE         | ACTIVE        | PDIP         | N                  | 16   | 25          | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -55 to 125   | CD4520BE                 | <a href="#">Samples</a> |
| CD4520BEE4       | ACTIVE        | PDIP         | N                  | 16   | 25          | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -55 to 125   | CD4520BE                 | <a href="#">Samples</a> |
| CD4520BF         | ACTIVE        | CDIP         | J                  | 16   | 1           | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | CD4520BF                 | <a href="#">Samples</a> |
| CD4520BF3A       | ACTIVE        | CDIP         | J                  | 16   | 1           | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 7702301EA<br>CD4520BF3A  | <a href="#">Samples</a> |
| CD4520BM         | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BM96       | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BM96E4     | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BM96G4     | ACTIVE        | SOIC         | D                  | 16   | 2500        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BME4       | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BMG4       | ACTIVE        | SOIC         | D                  | 16   | 40          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520BM                 | <a href="#">Samples</a> |
| CD4520BNSR       | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520B                  | <a href="#">Samples</a> |
| CD4520BNSRE4     | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520B                  | <a href="#">Samples</a> |
| CD4520BNSRG4     | ACTIVE        | SO           | NS                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CD4520B                  | <a href="#">Samples</a> |
| CD4520BPW        | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |
| CD4520BPWE4      | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|-------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| CD4520BPWG4      | ACTIVE        | TSSOP        | PW                 | 16   | 90          | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |
| CD4520BPWR       | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |
| CD4520BPWRE4     | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |
| CD4520BPWRG4     | ACTIVE        | TSSOP        | PW                 | 16   | 2000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -55 to 125   | CM520B                   | <a href="#">Samples</a> |

<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> Only one of markings shown within the brackets will appear on the physical device.

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**OTHER QUALIFIED VERSIONS OF CD4518B, CD4518B-MIL, CD4520B, CD4520B-MIL :**

- Catalog: [CD4518B](#), [CD4520B](#)
- Military: [CD4518B-MIL](#), [CD4520B-MIL](#)

NOTE: Qualified Version Definitions:

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

**TAPE AND REEL INFORMATION**


\*All dimensions are nominal

| Device     | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD4518BM96 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD4518BNSR | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD4518BPWR | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |
| CD4520BM96 | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| CD4520BNSR | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD4520BPWR | TSSOP        | PW              | 16   | 2000 | 330.0              | 12.4               | 6.9     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device     | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD4518BM96 | SOIC         | D               | 16   | 2500 | 333.2       | 345.9      | 28.6        |
| CD4518BNSR | SO           | NS              | 16   | 2000 | 367.0       | 367.0      | 38.0        |
| CD4518BPWR | TSSOP        | PW              | 16   | 2000 | 367.0       | 367.0      | 35.0        |
| CD4520BM96 | SOIC         | D               | 16   | 2500 | 333.2       | 345.9      | 28.6        |
| CD4520BNSR | SO           | NS              | 16   | 2000 | 367.0       | 367.0      | 38.0        |
| CD4520BPWR | TSSOP        | PW              | 16   | 2000 | 367.0       | 367.0      | 35.0        |

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.

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.

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.

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE

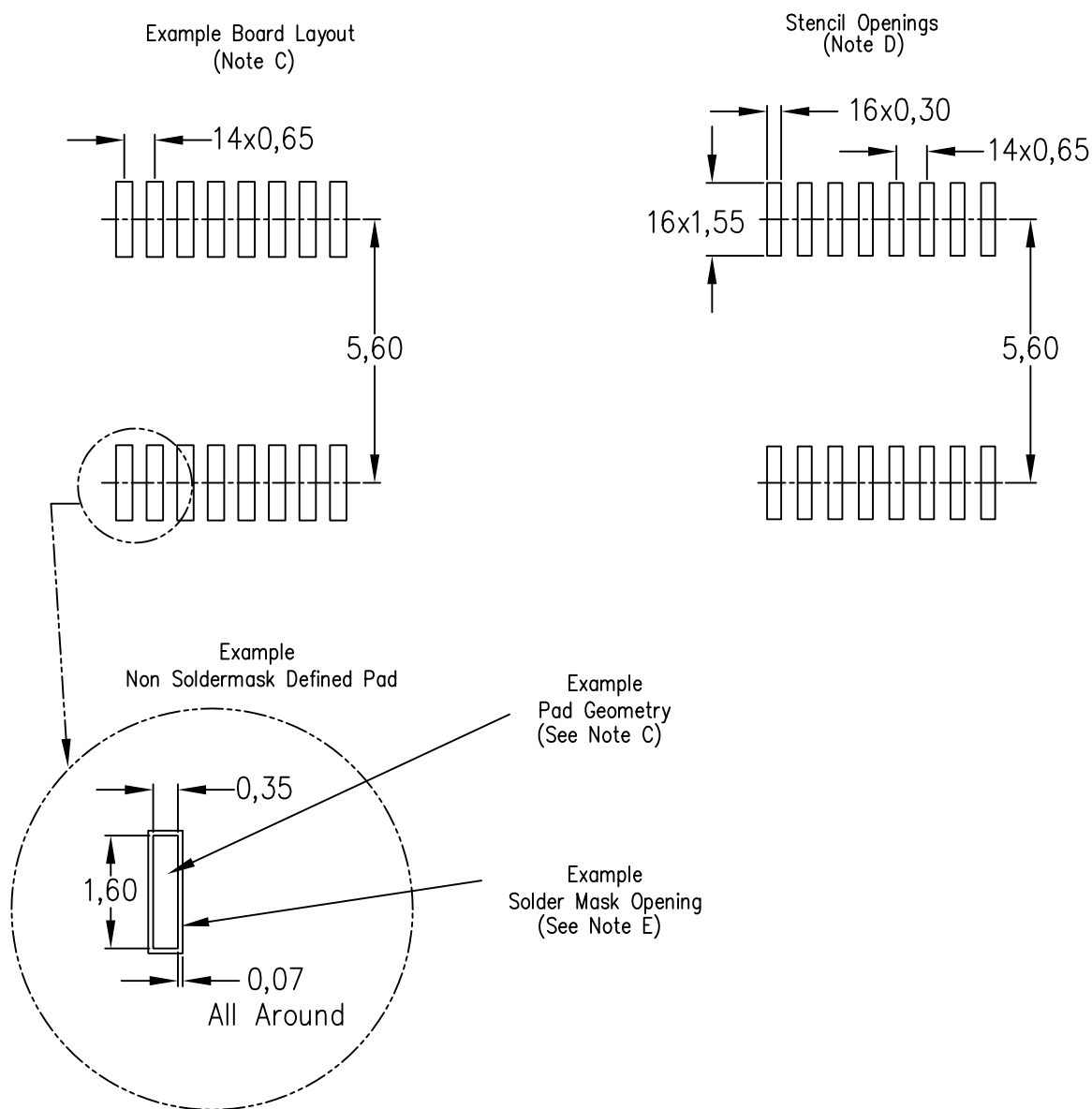


4040064-4/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - 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 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

PW (R-PDSO-G16)

PLASTIC SMALL OUTLINE



4211284-3/F 12/12

- 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



- 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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