

# CD4093B Types

## CMOS Quad 2-Input NAND Schmitt Triggers

High-Voltage Types (20 Volt Rating)

■ CD4093B consists of four Schmitt-trigger circuits. Each circuit functions as a two-input NAND gate with Schmitt-trigger action on both inputs. The gate switches at different points for positive- and negative-going signals. The difference between the positive voltage ( $V_P$ ) and the negative voltage ( $V_N$ ) is defined as hysteresis voltage ( $V_H$ ) (see Fig. 2).

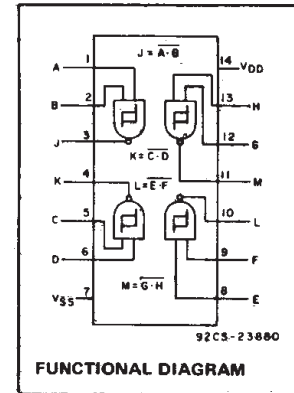
The CD4093B types are supplied in 14-lead hermetic dual-in-line ceramic packages (F3A suffix), 14-lead dual-in-line plastic packages (E suffix), 14-lead small-outline packages (M, MT, M96, and NSR suffixes), and 14-lead thin shrink small-outline packages (PW and PWR suffixes).

### Features:

- Schmitt-trigger action on each input with no external components
- Hysteresis voltage typically 0.9 V at  $V_{DD} = 5\text{ V}$  and 2.3 V at  $V_{DD} = 10\text{ V}$
- Noise immunity greater than 50%
- No limit on input rise and fall times
- Standardized, symmetrical output characteristics
- 100% tested for quiescent current at 20 V
- Maximum input current of  $1\text{ }\mu\text{A}$  at 18 V over full package-temperature range, 100 nA at 18 V and  $25^\circ\text{C}$
- 5-V, 10-V, and 15-V parametric ratings
- Meets all requirements of JEDEC Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

### Applications:

- Wave and pulse shapers
- High-noise-environment systems
- Monostable multivibrators
- Astable multivibrators
- NAND logic



### RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges.

| CHARACTERISTIC                                                 | MIN. | MAX. | UNITS |
|----------------------------------------------------------------|------|------|-------|
| Supply Voltage Range<br>( $T_A$ = Full Package<br>Temp. Range) | 3    | 18   | V     |

### MAXIMUM RATINGS, Absolute-Maximum Values:

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

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

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

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

PACKAGE THERMAL IMPEDANCE,  $\theta_{JA}$  (See Note 1):

E package .....  $80^\circ\text{C/W}$

M package .....  $86^\circ\text{C/W}$

NS package .....  $76^\circ\text{C/W}$

#### DEVICE DISSIPATION PER OUTPUT TRANSISTOR

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

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 ( $1.59 \pm 0.79\text{ mm}$ ) from case for 10s max .....  $+265^\circ\text{C}$

NOTE 1: Package thermal impedance is calculated in accordance with JESD 51-7.



\* ALL INPUTS PROTECTED BY CMOS PROTECTION NETWORK

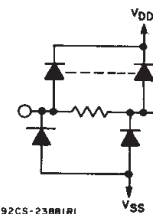


Fig. 1 – Logic diagram—1 of 4 Schmitt triggers.

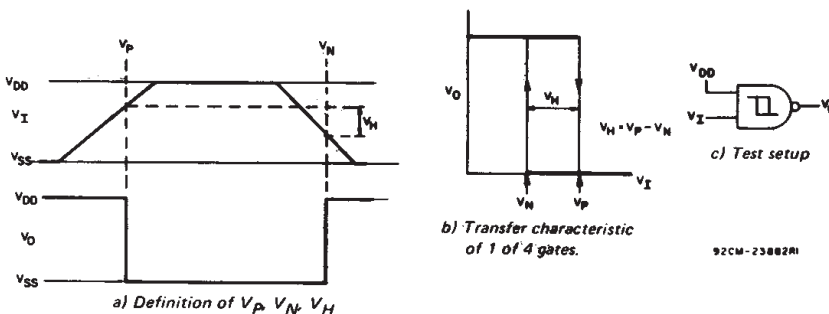


Fig. 2 – Hysteresis definition, characteristic, and test setup.

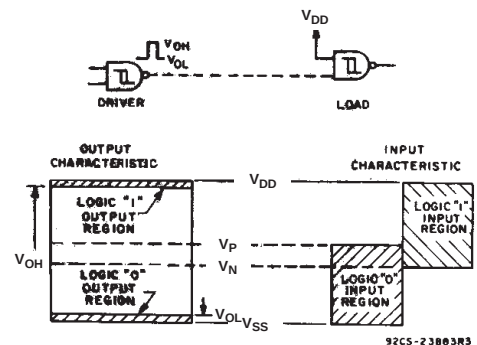


Fig. 3 – Input and output characteristics.

# CD4093B 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) | -55                                   | -40  | +85  | +125 | +25  |      |      |       |
|                                                              |                       |                        |                        |                                       |      |      |      | MIN. | TYP. | MAX. |       |
| Quiescent Device<br>Current, I <sub>DD</sub><br>Max.         | —                     | 0.5                    | 5                      | 1                                     | 1    | 30   | 30   | —    | 0.02 | 1    | μA    |
|                                                              | —                     | 0.10                   | 10                     | 2                                     | 2    | 60   | 60   | —    | 0.02 | 2    |       |
|                                                              | —                     | 0.15                   | 15                     | 4                                     | 4    | 120  | 120  | —    | 0.02 | 4    |       |
|                                                              | —                     | 0.20                   | 20                     | 20                                    | 20   | 600  | 600  | —    | 0.04 | 20   |       |
| Positive Trigger<br>Threshold Voltage<br>V <sub>p</sub> Min. | —                     | a                      | 5                      | 2.2                                   | 2.2  | 2.2  | 2.2  | 2.2  | 2.9  | —    | V     |
|                                                              | —                     | a                      | 10                     | 4.6                                   | 4.6  | 4.6  | 4.6  | 4.6  | 5.9  | —    |       |
|                                                              | —                     | a                      | 15                     | 6.8                                   | 6.8  | 6.8  | 6.8  | 6.8  | 8.8  | —    |       |
|                                                              | —                     | b                      | 5                      | 2.6                                   | 2.6  | 2.6  | 2.6  | 2.6  | 3.3  | —    |       |
|                                                              | —                     | b                      | 10                     | 5.6                                   | 5.6  | 5.6  | 5.6  | 5.6  | 7    | —    |       |
|                                                              | —                     | b                      | 15                     | 6.3                                   | 6.3  | 6.3  | 6.3  | 6.3  | 9.4  | —    |       |
| V <sub>p</sub> Max.                                          | —                     | a                      | 5                      | 3.6                                   | 3.6  | 3.6  | 3.6  | —    | 2.9  | 3.6  | V     |
|                                                              | —                     | a                      | 10                     | 7.1                                   | 7.1  | 7.1  | 7.1  | —    | 5.9  | 7.1  |       |
|                                                              | —                     | a                      | 15                     | 10.8                                  | 10.8 | 10.8 | 10.8 | —    | 8.8  | 10.8 |       |
|                                                              | —                     | b                      | 5                      | 4                                     | 4    | 4    | 4    | —    | 3.3  | 4    |       |
|                                                              | —                     | b                      | 10                     | 8.2                                   | 8.2  | 8.2  | 8.2  | —    | 7    | 8.2  |       |
|                                                              | —                     | b                      | 15                     | 12.7                                  | 12.7 | 12.7 | 12.7 | —    | 9.4  | 12.7 |       |
| Negative Trigger<br>Threshold Voltage<br>V <sub>N</sub> Min. | —                     | a                      | 5                      | 0.9                                   | 0.9  | 0.9  | 0.9  | 0.9  | 1.9  | —    | V     |
|                                                              | —                     | a                      | 10                     | 2.5                                   | 2.5  | 2.5  | 2.5  | 2.5  | 3.9  | —    |       |
|                                                              | —                     | a                      | 15                     | 4                                     | 4    | 4    | 4    | 4    | 5.8  | —    |       |
|                                                              | —                     | b                      | 5                      | 1.4                                   | 1.4  | 1.4  | 1.4  | 1.4  | 2.3  | —    |       |
|                                                              | —                     | b                      | 10                     | 3.4                                   | 3.4  | 3.4  | 3.4  | 3.4  | 5.1  | —    |       |
|                                                              | —                     | b                      | 15                     | 4.8                                   | 4.8  | 4.8  | 4.8  | 4.8  | 7.3  | —    |       |
| V <sub>N</sub> Max.                                          | —                     | a                      | 5                      | 2.8                                   | 2.8  | 2.8  | 2.8  | —    | 1.9  | 2.8  | V     |
|                                                              | —                     | a                      | 10                     | 5.2                                   | 5.2  | 5.2  | 5.2  | —    | 3.9  | 5.2  |       |
|                                                              | —                     | a                      | 15                     | 7.4                                   | 7.4  | 7.4  | 7.4  | —    | 5.8  | 7.4  |       |
|                                                              | —                     | b                      | 5                      | 3.2                                   | 3.2  | 3.2  | 3.2  | —    | 2.3  | 3.2  |       |
|                                                              | —                     | b                      | 10                     | 6.6                                   | 6.6  | 6.6  | 6.6  | —    | 5.1  | 6.6  |       |
|                                                              | —                     | b                      | 15                     | 9.6                                   | 9.6  | 9.6  | 9.6  | —    | 7.3  | 9.6  |       |
| Hysteresis Voltage<br>V <sub>H</sub> Min.                    | —                     | a                      | 5                      | 0.3                                   | 0.3  | 0.3  | 0.3  | 0.3  | 0.9  | —    | V     |
|                                                              | —                     | a                      | 10                     | 1.2                                   | 1.2  | 1.2  | 1.2  | 1.2  | 2.3  | —    |       |
|                                                              | —                     | a                      | 15                     | 1.6                                   | 1.6  | 1.6  | 1.6  | 1.6  | 3.5  | —    |       |
|                                                              | —                     | b                      | 5                      | 0.3                                   | 0.3  | 0.3  | 0.3  | 0.3  | 0.9  | —    |       |
|                                                              | —                     | b                      | 10                     | 1.2                                   | 1.2  | 1.2  | 1.2  | 1.2  | 2.3  | —    |       |
|                                                              | —                     | b                      | 15                     | 1.6                                   | 1.6  | 1.6  | 1.6  | 1.6  | 3.5  | —    |       |
| V <sub>H</sub> Max.                                          | —                     | a                      | 5                      | 1.6                                   | 1.6  | 1.6  | 1.6  | —    | 0.9  | 1.6  | V     |
|                                                              | —                     | a                      | 10                     | 3.4                                   | 3.4  | 3.4  | 3.4  | —    | 2.3  | 3.4  |       |
|                                                              | —                     | a                      | 15                     | 5                                     | 5    | 5    | 5    | —    | 3.5  | 5    |       |
|                                                              | —                     | b                      | 5                      | 1.6                                   | 1.6  | 1.6  | 1.6  | —    | 0.9  | 1.6  |       |
|                                                              | —                     | b                      | 10                     | 3.4                                   | 3.4  | 3.4  | 3.4  | —    | 2.3  | 3.4  |       |
|                                                              | —                     | b                      | 15                     | 5                                     | 5    | 5    | 5    | —    | 3.5  | 5    |       |

<sup>a</sup> Input on terminals 1,5,8,12 or 2,6,9,13; other inputs to V<sub>DD</sub>.

<sup>b</sup> Input on terminals 1 and 2, 5 and 6, 8 and 9, or 12 and 13; other inputs to V<sub>DD</sub>.

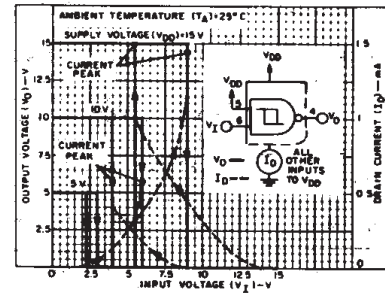


Fig. 4 — Typical current and voltage transfer characteristics.

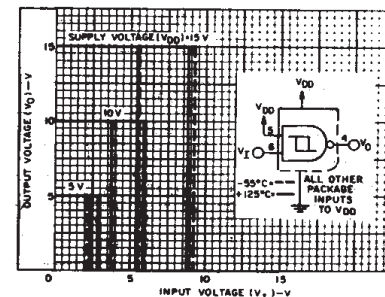


Fig. 5 — Typical voltage transfer characteristics as a function of temperature.

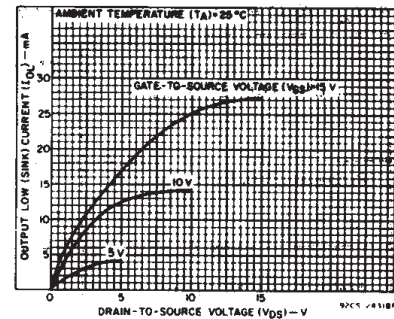


Fig. 6 — Typical output low (sink) current characteristics.

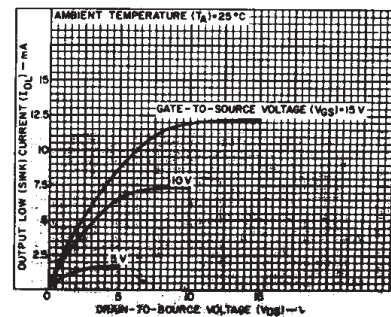


Fig. 7 — Minimum output low (sink) current characteristics.

## CD4093B Types

### STATIC ELECTRICAL CHARACTERISTICS (CONT'D)

| 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) | -55                                   | -40   | +85   | +125  | +25   |                   |      |       |
|                                                             |                       |                        |                        |                                       |       |       |       | MIN.  | TYP.              | MAX. |       |
| Output Low (Sink)<br>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 |                   | —    |       |
| Input Current,<br>I <sub>IN</sub> Max.                      | —                     | 0.18                   | 18                     | ±0.1                                  | ±0.1  | ±1    | ±1    | —     | ±10 <sup>-5</sup> | ±0.1 | μA    |

### DYNAMIC ELECTRICAL CHARACTERISTICS

At  $T_A = 25^\circ\text{C}$ ; Input  $t_r, t_f = 20\text{ ns}$ ,  $C_L = 50\text{ pF}$ ,  $R_L = 200\text{ k}\Omega$

| CHARACTERISTIC                                                    | TEST CONDITIONS | LIMITS                   |      | UNITS |      |
|-------------------------------------------------------------------|-----------------|--------------------------|------|-------|------|
|                                                                   |                 | V <sub>DD</sub><br>VOLTS | TYP. |       | MAX. |
| Propagation Delay Time:<br>t <sub>PHL</sub> ,<br>t <sub>PLH</sub> |                 | 5                        | 190  | 380   | ns   |
|                                                                   |                 | 10                       | 90   | 180   |      |
|                                                                   |                 | 15                       | 65   | 130   |      |
| Transition Time, t <sub>THL</sub> ,<br>t <sub>TLH</sub>           |                 | 5                        | 100  | 200   | ns   |
|                                                                   |                 | 10                       | 50   | 100   |      |
|                                                                   |                 | 15                       | 40   | 80    |      |
| Input Capacitance, C <sub>IN</sub>                                | Any Input       |                          | 5    | 7.5   | pF   |

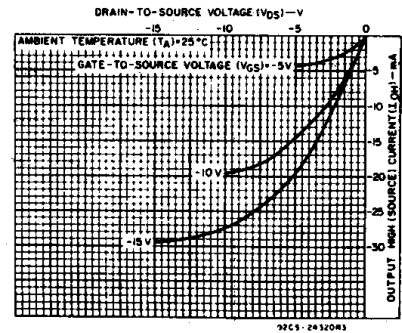


Fig. 8 - Typical output high (source) current characteristics.

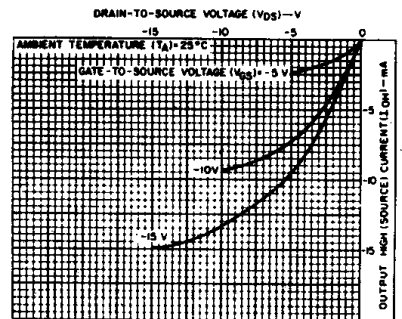


Fig. 9 - Minimum output high (source) current characteristics.

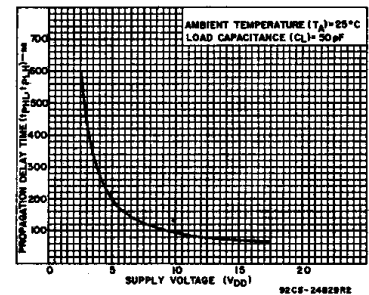


Fig. 10 - Typical propagation delay time vs. supply voltage.

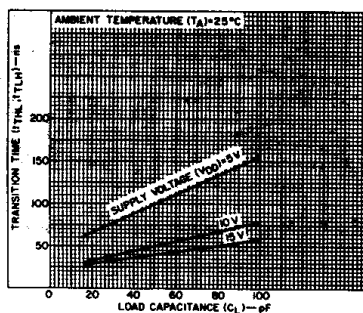


Fig. 11 - Typical transition time vs. load capacitance.

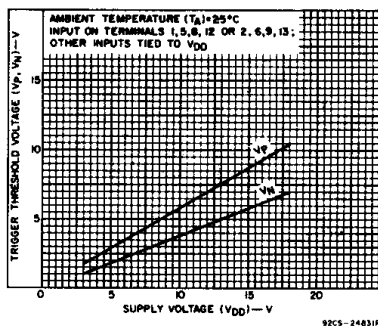


Fig. 12 - Typical trigger threshold voltage vs.  $V_{DD}$ .

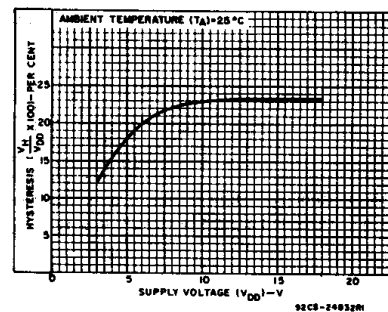
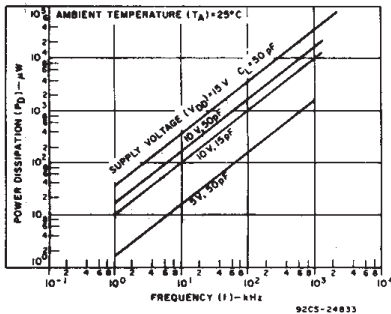
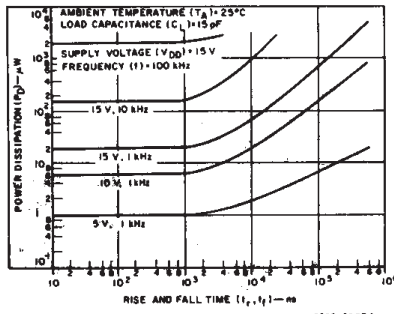


Fig. 13 - Typical per cent hysteresis vs. supply voltage.

## CD4093B Types

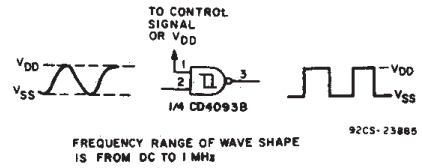


**Fig. 14 – Typical power dissipation vs. frequency characteristics.**

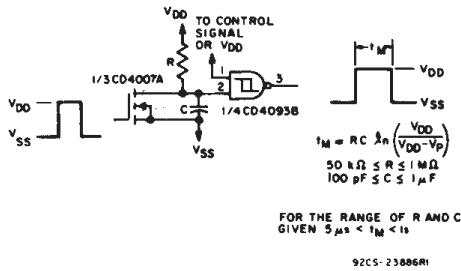


**Fig. 15 — Typical power dissipation vs. rise and fall times.**

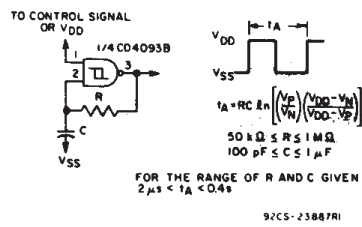
## APPLICATIONS



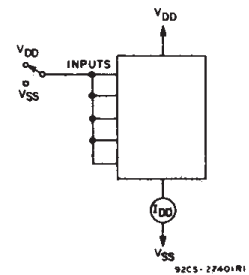
**Fig. 16 — Wave shaper.**



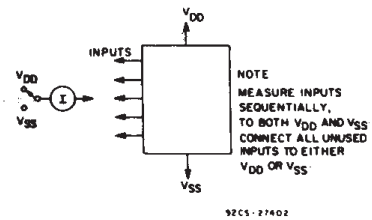
**Fig. 17 – Monostable multivibrator.**



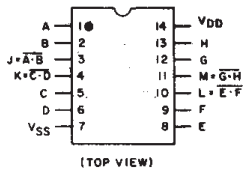
**Fig. 18 — Astable multivibrator.**



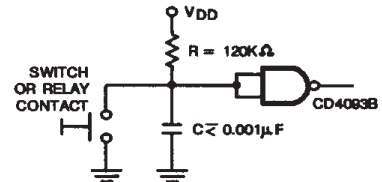
**Fig. 19 — Quiescent device current test circuit.**



**Fig. 20 – Input current test circuit.**



## TERMINAL ASSIGNMENT



**Fig. 21 - Contact Debaucher**

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| 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> |
| Low Power Wireless | <a href="http://www.ti.com/lpw">www.ti.com/lpw</a>                 |

### Applications

|                    |                                                                          |
|--------------------|--------------------------------------------------------------------------|
| Audio              | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                   |
| Automotive         | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>         |
| Broadband          | <a href="http://www.ti.com/broadband">www.ti.com/broadband</a>           |
| Digital Control    | <a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a> |
| Military           | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Optical Networking | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
| Security           | <a href="http://www.ti.com/security">www.ti.com/security</a>             |
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**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 7704602CA        | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| CD4093BE         | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD4093BEE4       | ACTIVE                | PDIP         | N               | 14   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| CD4093BF         | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| CD4093BF3A       | ACTIVE                | CDIP         | J               | 14   | 1           | TBD                     | A42              | N / A for Pkg Type           |
| CD4093BM         | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BM96       | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BM96E4     | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BM96G4     | ACTIVE                | SOIC         | D               | 14   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BME4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BMG4       | ACTIVE                | SOIC         | D               | 14   | 50          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BMT        | ACTIVE                | SOIC         | D               | 14   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BMTE4      | ACTIVE                | SOIC         | D               | 14   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BMTG4      | ACTIVE                | SOIC         | D               | 14   | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BNSR       | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BNSRE4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BNSRG4     | ACTIVE                | SO           | NS              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPW        | ACTIVE                | TSSOP        | PW              | 14   | 90          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPWE4      | ACTIVE                | TSSOP        | PW              | 14   | 90          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPWG4      | ACTIVE                | TSSOP        | PW              | 14   | 90          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPWR       | ACTIVE                | TSSOP        | PW              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPWRE4     | ACTIVE                | TSSOP        | PW              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| CD4093BPWRG4     | ACTIVE                | TSSOP        | PW              | 14   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

<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.

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**OBSELETE:** 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.

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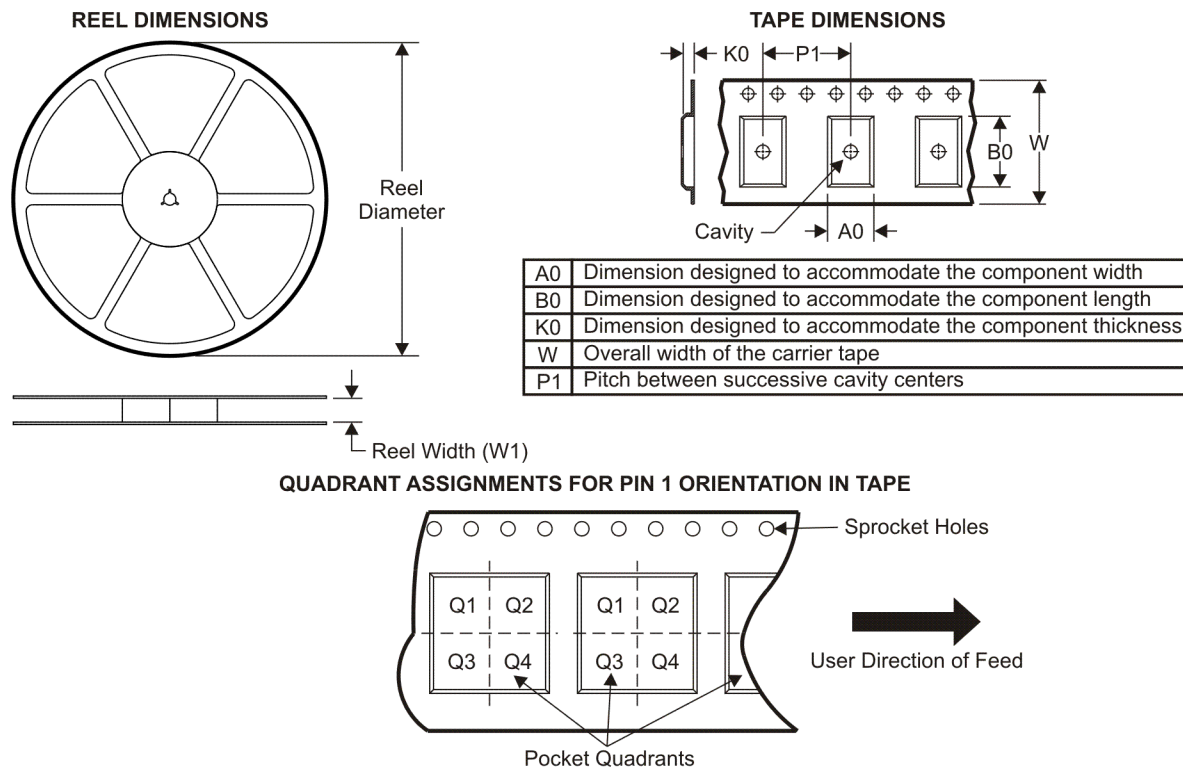
**OTHER QUALIFIED VERSIONS OF CD4093B, CD4093B-MIL :**

- Automotive: [CD4093B-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

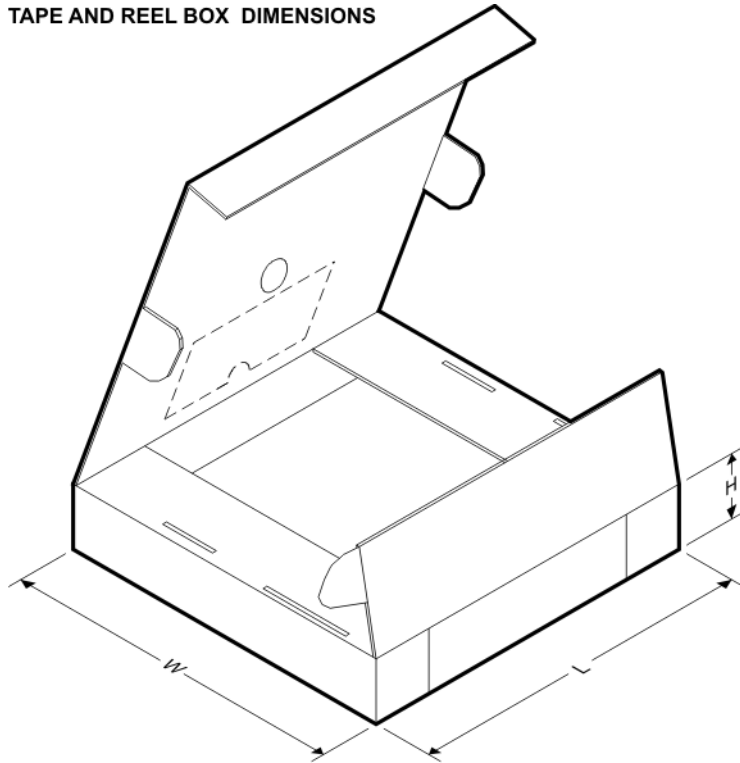
**TAPE AND REEL INFORMATION**



\*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 |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CD4093BM96 | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| CD4093BNSR | SO           | NS              | 14   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |
| CD4093BPWR | TSSOP        | PW              | 14   | 2000 | 330.0              | 12.4               | 7.0     | 5.6     | 1.6     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



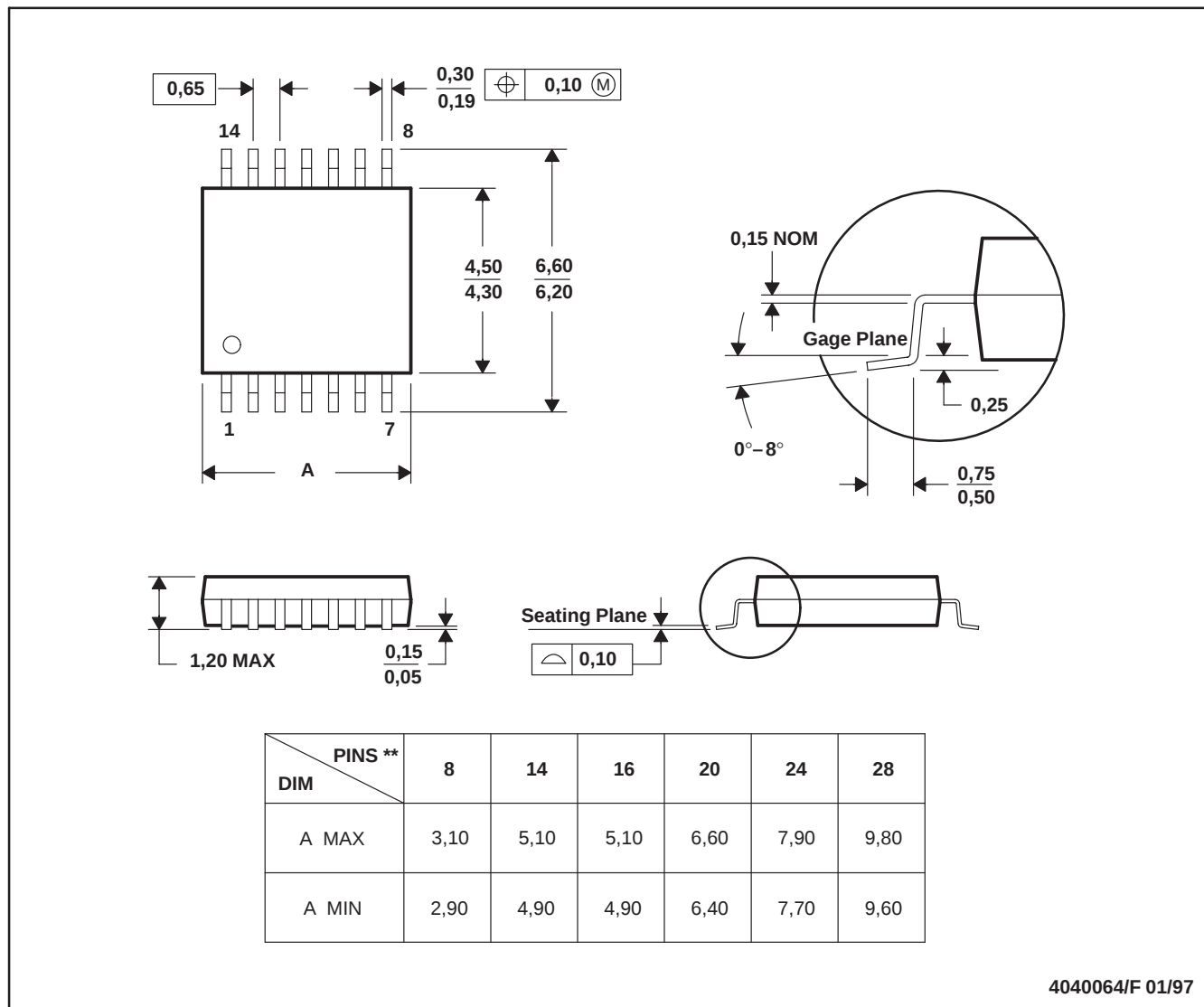
\*All dimensions are nominal

| Device     | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CD4093BM96 | SOIC         | D               | 14   | 2500 | 346.0       | 346.0      | 33.0        |
| CD4093BNSR | SO           | NS              | 14   | 2000 | 346.0       | 346.0      | 33.0        |
| CD4093BPWR | TSSOP        | PW              | 14   | 2000 | 346.0       | 346.0      | 29.0        |

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

## PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



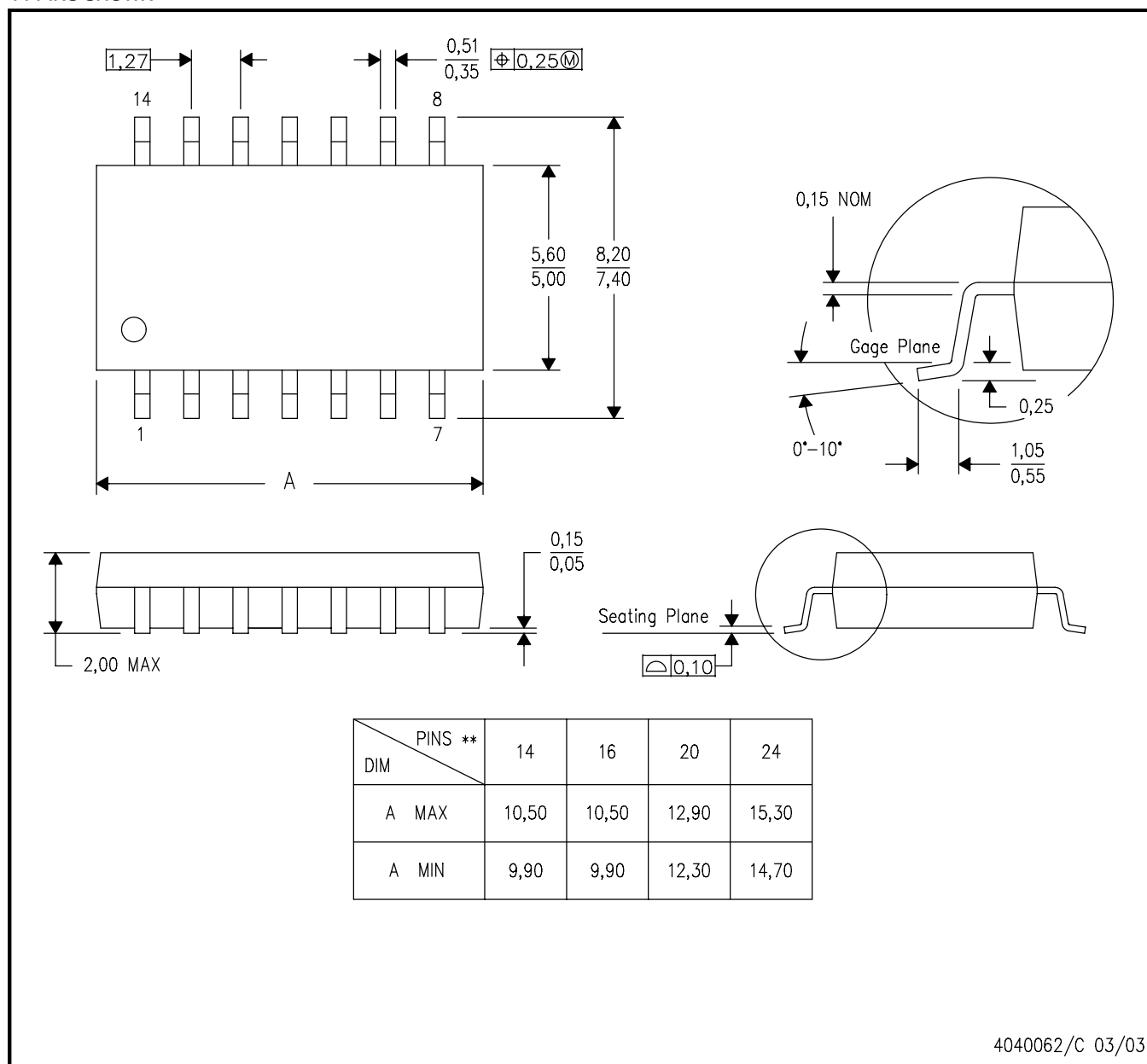
- NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.  
 D. Falls within JEDEC MO-153

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



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

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)        |

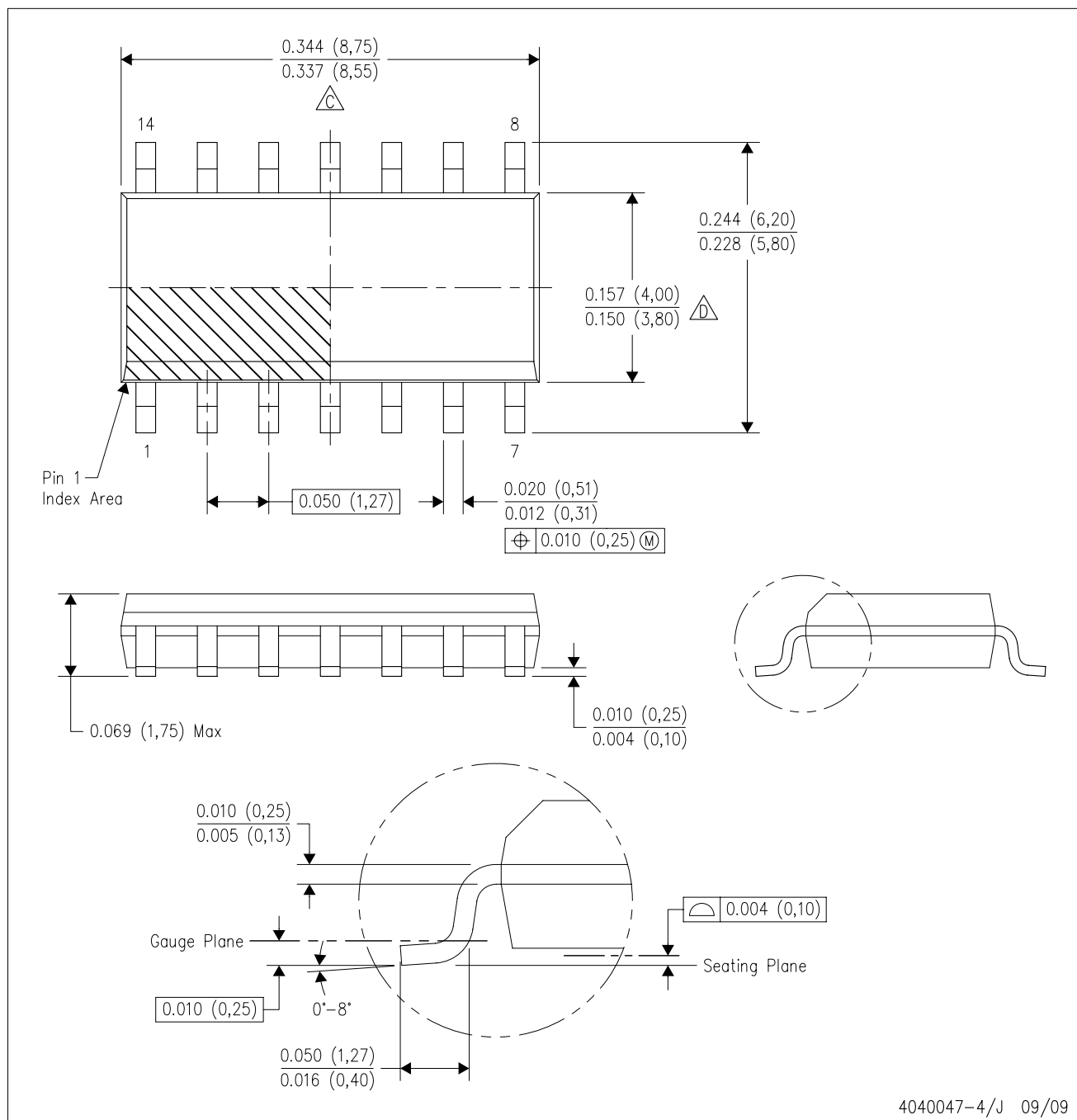


4040083/F 03/03

- 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.

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
- $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
- E. Reference JEDEC MS-012 variation AB.

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.