

CMOS Hex Buffer

High-Voltage Types (20-Volt Rating)
3-State Non-Inverting Type

■ CD4503B is a hex noninverting buffer with 3-state outputs having high sink- and source-current capability. Two disable controls are provided, one of which controls four buffers and the other controls the remaining two buffers. The CD4503B types are supplied in 16-lead hermetic dual-in-line ceramic packages (D and F suffixes), 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline package (NSR suffix), and in chip form (H suffix).

Features:

- 1 TTL-load output drive capability
- 2 output-disable controls
- 3-state outputs
- Pin compatible with industry types MM80C97, MC14503, and 340097
- 5-V, 10-V, and 15-V parametric ratings
- Maximum input current of 1 μ A at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

Applications:

- 3-state hex buffer for interfacing IC's with data buses
- CMOS to TTL hex buffer

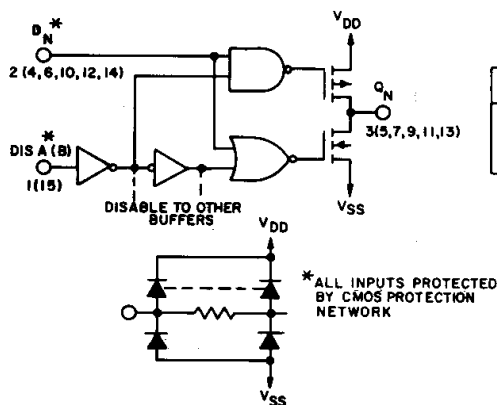
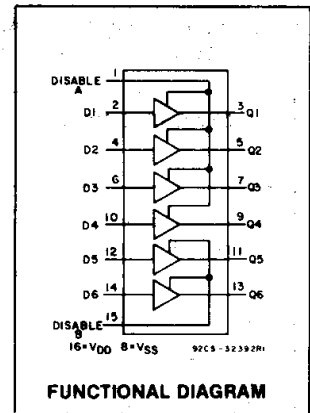


Fig. 1—Logic diagram of 1 to 6 identical buffers.

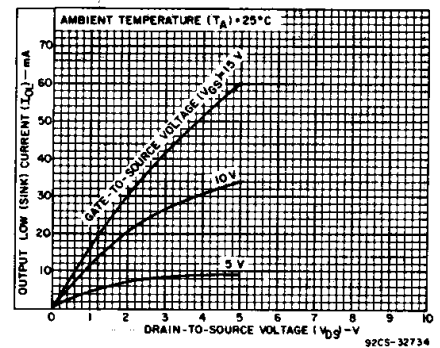


Fig. 2—Typical n-channel output low (sink) current characteristics.

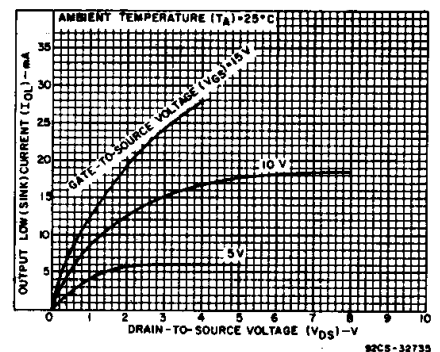


Fig. 3—Minimum n-channel output low (sink) current characteristics.

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 10mA

POWER DISSIPATION PER PACKAGE (P_D):

For T_A = -55°C to +100°C 500mW

For T_A = +100°C to +125°C Derate Linearly at 12mW/°C to 200mW

DEVICE DISSIPATION PER OUTPUT TRANSISTOR

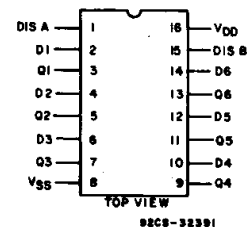
FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW

OPERATING-TEMPERATURE RANGE (T_A) -55°C to +125°C

STORAGE TEMPERATURE RANGE (T_{stg}) -65°C to +150°C

LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16 \pm 1/32 inch (1.59 \pm 0.79mm) from case for 10s max +265°C



TERMINAL ASSIGNMENT

CD4503B Types

STATIC ELECTRICAL CHARACTERISTICS

| CHARACTERISTIC | CONDITIONS | | | LIMITS AT INDICATED TEMPERATURES (°C) | | | | | | | UNITS |
|---|--------------------|---------------------|---------------------|---------------------------------------|-------|------|------|-------|-------------------|------|-------|
| | V _O (V) | V _{IN} (V) | V _{DD} (V) | -55 | -40 | +85 | +125 | +25 | | | |
| | | | | | | | | Min. | Typ. | Max. | |
| Quiescent Device Current, I _{DD} Max. | — | 0,5 | 5 | 1 | 1 | 30 | 30 | — | 0,02 | 1 | μA |
| | — | 0,10 | 10 | 2 | 2 | 60 | 60 | — | 0,02 | 2 | |
| Output Low (Sink) Current, I _{OL} Min. | 0,4 | 0 | 5 | 2,6 | 2,5 | 1,4 | 1,3 | 2,1 | 2,3 | — | mA |
| | 0,5 | 0 | 10 | 6,5 | 6,4 | 3,9 | 3,8 | 5,5 | 6,2 | — | |
| Output High (Source) Current, I _{OH} Min. | 1,5 | 0 | 15 | 19,2 | 18,9 | 11,4 | 11,2 | 16,1 | 23 | — | mA |
| | 4,6 | 5 | 5 | -1,2 | -1,16 | -0,7 | -0,7 | -1,02 | -1,9 | — | |
| Output Voltage: Low-Level, V _{OL} Max. | — | 0,5 | 5 | 0,05 | | | — | | | 0 | V |
| | — | 0,10 | 10 | 0,05 | | | — | | | 0 | |
| Output Voltage: High-Level, V _{OH} Min. | — | 0,5 | 5 | 4,95 | | | 4,95 | | | 5 | V |
| | — | 0,10 | 10 | 9,95 | | | 9,95 | | | 10 | |
| Input Low Voltage, V _{IL} Max. | 0,5,4,5 | — | 5 | 1,5 | | | — | | | 1,5 | V |
| | 1,9 | — | 10 | 3 | | | — | | | 3 | |
| Input High Voltage, V _{IH} Min. | 1,5,13,5 | — | 15 | 4 | | | — | | | 4 | V |
| | 0,5,4,5 | — | 5 | 3,5 | | | 3,5 | | | — | |
| Input Current I _{IN} Max. | 1,9 | — | 10 | 7 | | | 7 | | | — | μA |
| | 1,5,13,5 | — | 15 | 11 | | | 11 | | | — | |
| 3-State Output Leakage Current, I _{OUT} Max. | — | 0,18 | 18 | ±0,1 | ±0,1 | ±1 | ±1 | — | ±10 ⁻⁵ | ±0,1 | μA |

RECOMMENDED OPERATING CONDITIONS

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

| CHARACTERISTIC | LIMITS | | UNITS |
|--|--------|------|-------|
| | Min. | Max. | |
| Supply-Voltage Range (For T _A = Full Package-Temperature Range) | 3 | 18 | V |

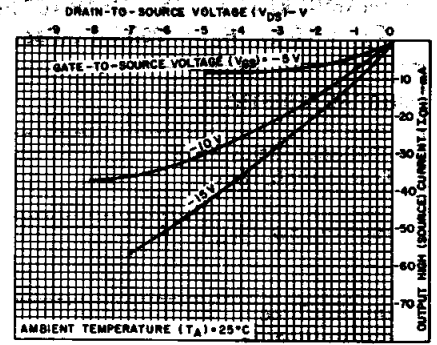


Fig. 4—Typical p-channel output high (source) current characteristics.

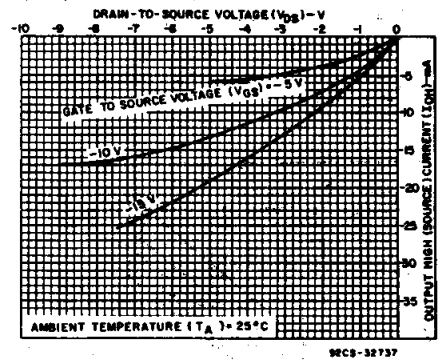


Fig. 5—Minimum p-channel output high (source) current characteristics.

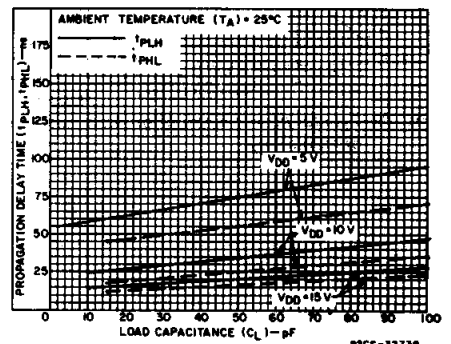


Fig. 6—Typical propagation delay time as a function of load capacitance.

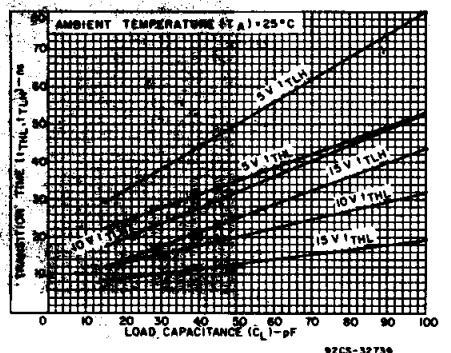


Fig. 7—Typical transition time as a function of load capacitance.

3
COMMERCIAL CMOS
HIGH VOLTAGE ICs

CD4503B Types

DYNAMIC ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$; input $t_r, t_f = 20\text{ ns}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$ unless otherwise specified.

| CHARACTERISTIC | V_{DD} (V) | LIMITS | | UNITS |
|--|--------------|--------|------|-------|
| | | Typ. | Max. | |
| Propagation Delay Time: Low-to-High, t_{PLH} | 5 | 75 | 150 | ns |
| | 10 | 35 | 70 | |
| | 15 | 25 | 50 | |
| High-to-Low, t_{PHL} | 5 | 55 | 110 | ns |
| | 10 | 25 | 50 | |
| | 15 | 17 | 35 | |
| Transition Time: Low-to-High, t_{TLH} | 5 | 50 | 90 | ns |
| | 10 | 30 | 45 | |
| | 15 | 25 | 35 | |
| High-to-Low, t_{THL} | 5 | 35 | 70 | ns |
| | 10 | 20 | 40 | |
| | 15 | 13 | 25 | |
| 3-State Propagation Delay Time: $R_L = 1\text{ k}\Omega$ t_{PHZ}, t_{PZH} | 5 | 70 | 140 | ns |
| | 10 | 30 | 60 | |
| | 15 | 25 | 50 | |
| t_{PZL}, t_{PLZ} | 5 | 90 | 180 | ns |
| | 10 | 40 | 80 | |
| | 15 | 35 | 70 | |

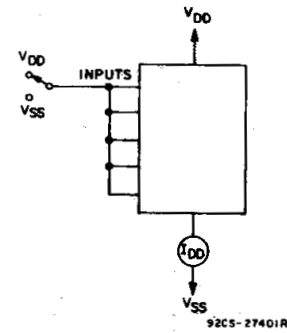


Fig. 10—Quiescent device current test circuit.

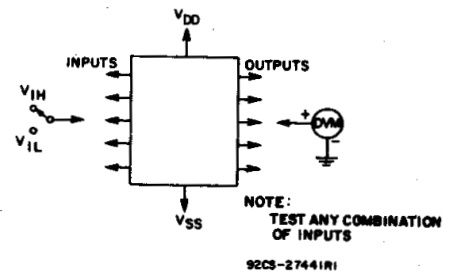


Fig. 11—Input voltage test circuit.

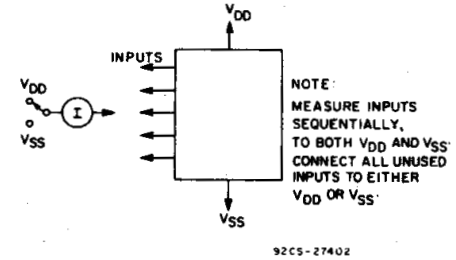


Fig. 12—Input current test circuit.

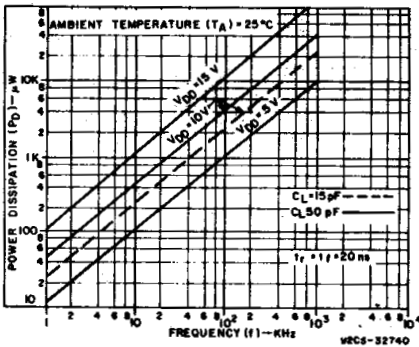


Fig. 8—Typical power dissipation as a function of frequency.

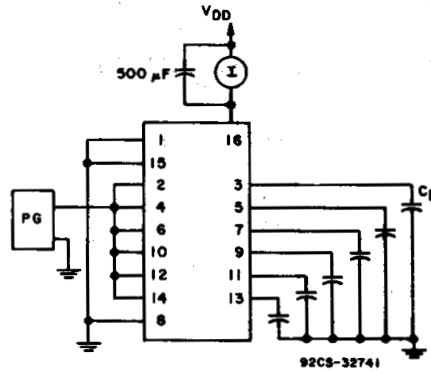
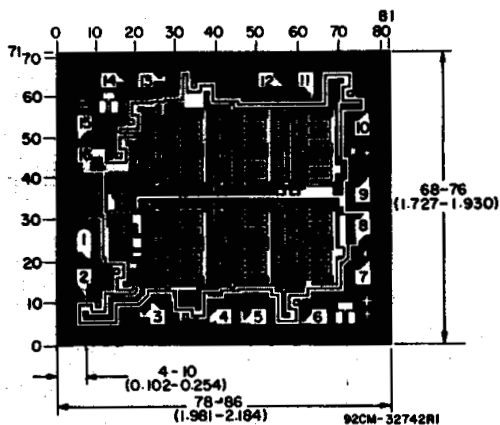


Fig. 9—Dynamic power dissipation test circuit.



Dimensions and pad layout for CD4503BH

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

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