

# Hex inverter

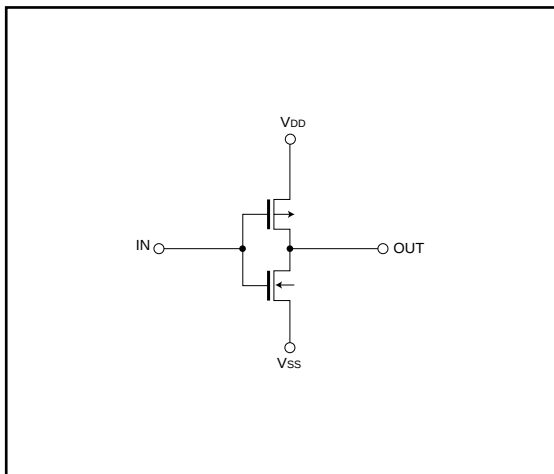
## BU4069UB / BU4069UBF / BU4069UBFV

The BU4069UB, BU4069UBF and BU4069UBFV are six-circuit inverters with no buffers. A single-stage gate configuration reduces the propagation time.

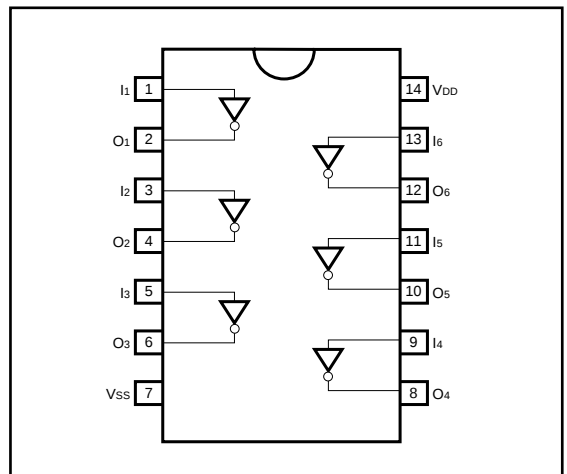
### ●Features

- 1) Low power dissipation.
- 2) Wide range of operating power supply voltages.
- 3) High input impedance.
- 4) High fan-out.
- 5) Direct drive of 2 L-TTL inputs and 1 LS-TTL input.

### ●Logic circuit diagram



### ●Block diagram



### ●Absolute maximum ratings ( $V_{SS} = 0V$ , $T_a = 25^{\circ}C$ )

| Parameter             | Symbol    | Limits                                | Unit        |
|-----------------------|-----------|---------------------------------------|-------------|
| Power supply voltage  | $V_{DD}$  | $-0.3 \sim +18$                       | V           |
| Power dissipation     | $P_d$     | 1000 (DIP), 450 (SOP), 350 (SSOP-B14) | mW          |
| Operating temperature | $T_{opr}$ | $-40 \sim +85$                        | $^{\circ}C$ |
| Storage temperature   | $T_{stg}$ | $-55 \sim +150$                       | $^{\circ}C$ |
| Input voltage         | $V_{IN}$  | $-0.3 \sim V_{DD} + 0.3$              | V           |

## ●Electrical characteristics

DC characteristics (unless otherwise noted,  $V_{SS} = 0V$ ,  $T_a = 25^\circ C$ )

| Parameter                  | Symbol   | Min.   | Typ. | Max.  | Unit    | $V_{DD}$ (V) | Conditions            | Measurement circuit |
|----------------------------|----------|--------|------|-------|---------|--------------|-----------------------|---------------------|
|                            |          |        |      |       |         |              |                       |                     |
| Input high level voltage   | $V_{IH}$ | 4.0    | —    | —     | V       | 5            | —                     | Fig.1               |
|                            |          | 8.0    | —    | —     |         | 10           |                       |                     |
|                            |          | 12.5   | —    | —     |         | 15           |                       |                     |
| Input low level voltage    | $V_{IL}$ | —      | —    | 1.0   | V       | 5            | —                     | Fig.1               |
|                            |          | —      | —    | 2.0   |         | 10           |                       |                     |
|                            |          | —      | —    | 2.5   |         | 15           |                       |                     |
| Input high level current   | $I_{IH}$ | —      | —    | 0.3   | $\mu A$ | 15           | $V_{IH} = 15V$        | Fig.1               |
| Input low level current    | $I_{IL}$ | —      | —    | - 0.3 | $\mu A$ | 15           | $V_{IL} = 0V$         | Fig.1               |
| Output high level voltage  | $V_{OH}$ | 4.95   | —    | —     | V       | 5            | $I_o = 0mA$           | Fig.1               |
|                            |          | 9.95   | —    | —     |         | 10           |                       |                     |
|                            |          | 14.95  | —    | —     |         | 15           |                       |                     |
| Output low level voltage   | $V_{OL}$ | —      | —    | 0.05  | V       | 5            | $I_o = 0mA$           | Fig.1               |
|                            |          | —      | —    | 0.05  |         | 10           |                       |                     |
|                            |          | —      | —    | 0.05  |         | 15           |                       |                     |
| Output high level current  | $I_{OH}$ | - 0.16 | —    | —     | mA      | 5            | $V_{OH} = 4.6V$       | Fig.1               |
|                            |          | - 0.4  | —    | —     |         | 10           | $V_{OH} = 9.5V$       |                     |
|                            |          | - 1.2  | —    | —     |         | 15           | $V_{OH} = 13.5V$      |                     |
| Output low level current   | $I_{OL}$ | 0.44   | —    | —     | mA      | 5            | $V_{OL} = 0.4V$       | Fig.1               |
|                            |          | 1.1    | —    | —     |         | 10           | $V_{OL} = 0.5V$       |                     |
|                            |          | 3.0    | —    | —     |         | 15           | $V_{OL} = 1.5V$       |                     |
| Static current dissipation | $I_{DD}$ | —      | —    | 1     | $\mu A$ | 5            | $V_i = V_{DD}$ or GND | —                   |
|                            |          | —      | —    | 2     |         | 10           |                       |                     |
|                            |          | —      | —    | 4     |         | 15           |                       |                     |

Switching characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ ,  $C_L = 50\text{pF}$ )

| Parameter                            | Symbol    | Min. | Typ. | Max. | Unit | $V_{DD}$ (V) | Conditions | Measurement circuit |
|--------------------------------------|-----------|------|------|------|------|--------------|------------|---------------------|
|                                      |           |      |      |      |      |              |            |                     |
| Output rise time                     | $t_{TLH}$ | —    | 180  | —    | ns   | 5            | —          | Fig.2               |
|                                      |           | —    | 90   | —    |      | 10           |            |                     |
|                                      |           | —    | 65   | —    |      | 15           |            |                     |
| Output fall time                     | $t_{THL}$ | —    | 100  | —    | ns   | 5            | —          | Fig.2               |
|                                      |           | —    | 50   | —    |      | 10           |            |                     |
|                                      |           | —    | 40   | —    |      | 15           |            |                     |
| "L" to "H"<br>Propagation delay time | $t_{PLH}$ | —    | 90   | —    | ns   | 5            | —          | Fig.2               |
|                                      |           | —    | 50   | —    |      | 10           |            |                     |
|                                      |           | —    | 40   | —    |      | 15           |            |                     |
| "H" to "L"<br>Propagation delay time | $t_{PHL}$ | —    | 65   | —    | ns   | 5            | —          | Fig.2               |
|                                      |           | —    | 40   | —    |      | 10           |            |                     |
|                                      |           | —    | 30   | —    |      | 15           |            |                     |
| Input capacitance                    | $C_{IN}$  | —    | 5    | —    | pF   | —            | —          | —                   |

## ●Measurement circuits

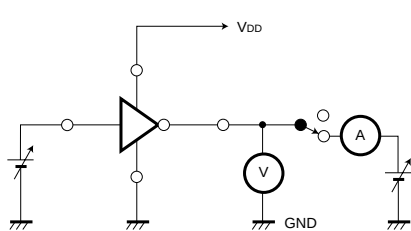


Fig. 1 DC characteristics

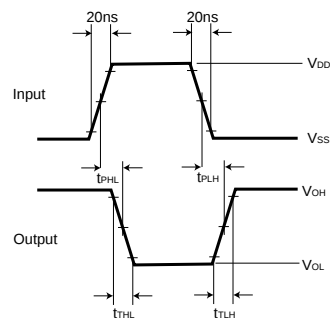
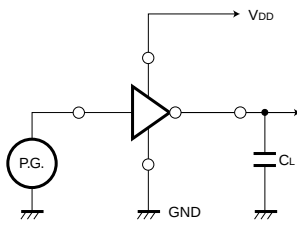


Fig. 2 Switching characteristics

●Electrical characteristic curve

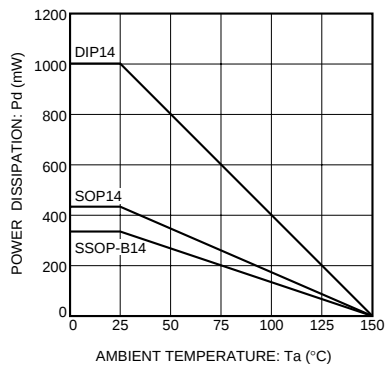


Fig. 3 Power dissipation vs. Ta

●External dimensions (Units: mm)

