# Quad exclusive OR gate
## BU4030B/BU4030BF
## BU4070B/BU4070BF

The BU4030B/F and BU4070B/F are exclusive OR gates.

Four circuits are contained on a single chip. An inverter-based buffer is added to the gate output for an enhanced I/O voltage characteristic, and the load capacitance has been increased to minimize fluctuation in the propagation time.

In addition, these products feature low power consumption and a high noise margin.

These can also be used in digital comparators and parity circuit applications.
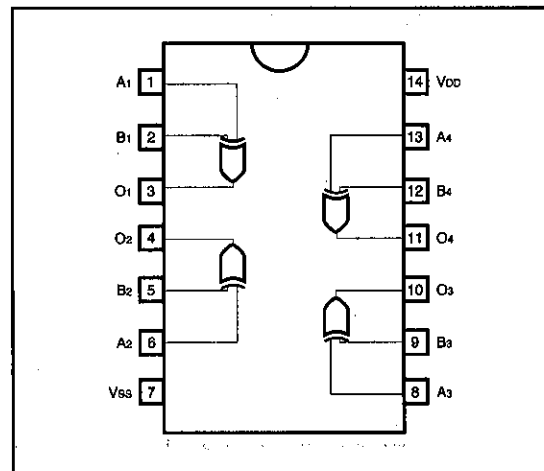
●Features

1) Low power consumption.
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.

●Truth table

| INPUT | | OUTPUT |
|---|---|---|
| A | B | |
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

●Block diagram



●Absolute maximum ratings (Ta=25℃)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | $V_{DD}$ | $-0.3 \sim 18$ | V |
| Power dissipation | Pd | 1000 (DIP) , 450 (SOP) | mW |
| Operating temperature | Topr | $-40 \sim 85$ | ℃ |
| Storage temperature | Tstg | $-55 \sim 150$ | ℃ |
| Input voltage | $V_{IN}$ | $-0.3 \sim V_{DD} + 0.3$ | V |

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●Electrical characteristics

DC characteristics (unless otherwise noted, Ta=25℃)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | $V_{DD}$ (V) | Conditions | Measurement Circuit |
|---|---|---|---|---|---|---|---|---|
| "H" input voltage | $V_{IH}$ | 3.5 | — | — | V | 5 | — | Fig.1 |
| | | 7.0 | — | — | | 10 | | |
| | | 11.0 | — | — | | 15 | | |
| "L" input voltage | $V_{IL}$ | — | — | 1.5 | V | 5 | — | Fig.1 |
| | | — | — | 3.0 | | 10 | | |
| | | — | — | 4.0 | | 15 | | |
| "H" input current | $I_{IH}$ | — | — | 0.3 | $\mu A$ | 15 | $V_{IH}$=15V | Fig.1 |
| "L" input current | $I_{IL}$ | — | — | −0.3 | $\mu A$ | 15 | $V_{IL}$=0V | Fig.1 |
| "H" output voltage | $V_{OH}$ | 4.95 | — | — | V | 5 | $I_O$=0mA | Fig.1 |
| | | 9.95 | — | — | | 10 | | |
| | | 14.95 | — | — | | 15 | | |
| "L" output voltage | $V_{OL}$ | — | — | 0.05 | V | 5 | $I_O$=0mA | Fig.1 |
| | | — | — | 0.05 | | 10 | | |
| | | — | — | 0.05 | | 15 | | |
| "H" output 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 | |
| "L" output 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 | |
| Quiescent supply current | $I_{DD}$ | — | — | 1 | $\mu A$ | 5 | $V_I$=$V_{DD}$ or GND | — |
| | | — | — | 2 | | 10 | | |
| | | — | — | 4 | | 15 | | |

Switching characteristics (unless otherwise noted, Ta=25°C, C_L=50pF)

| 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" propagation delay time | t_PLH | — | 175 | — | ns | 5 | — | Fig.2 |
| | | — | 75 | — | | 10 | | |
| | | — | 50 | — | | 15 | | |
| "H" to "L" propagation delay time | t_PHL | — | 175 | — | ns | 5 | — | Fig.2 |
| | | — | 75 | — | | 10 | | |
| | | — | 50 | — | | 15 | | |
| Input capacitance | C_I | — | 5 | — | pF | — | — | — |

●Measurement circuits
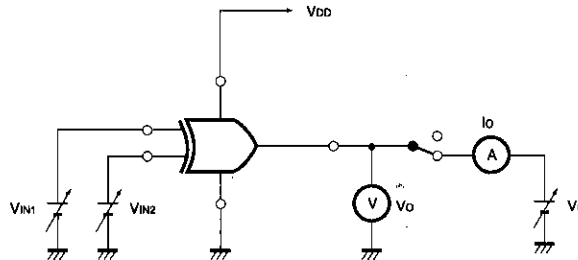


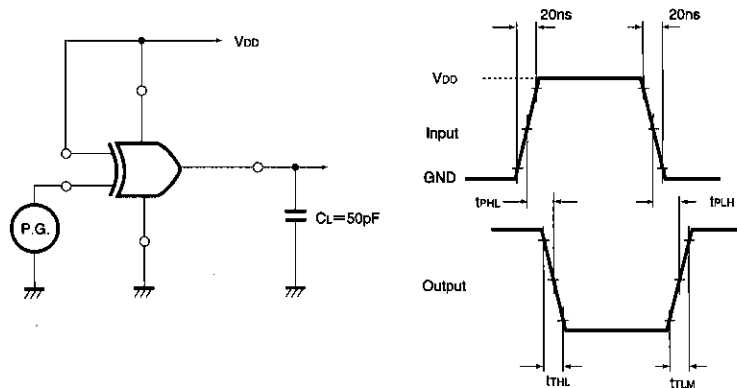Fig. 1 DC characteristics measurement circuit



Fig. 2 Switching characteristics measurement circuit
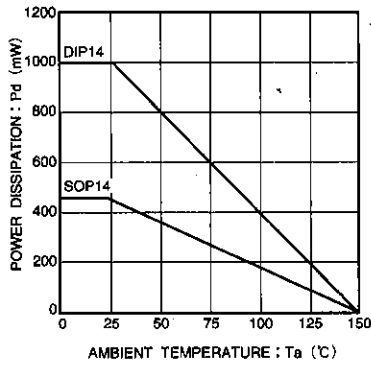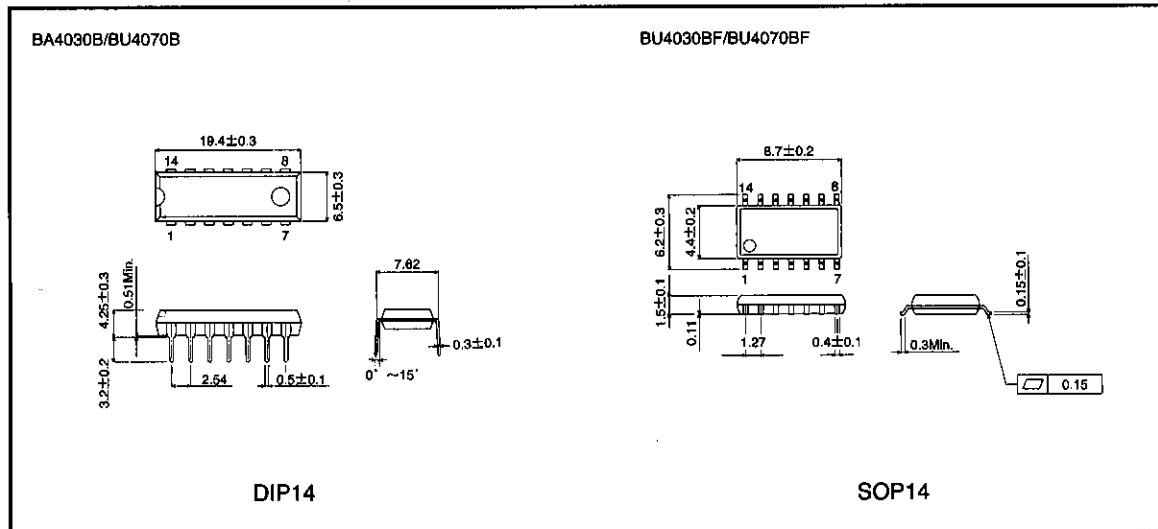
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● Electrical characteristic curve



Fig.3 Power dissipation - Ta characteristic

● External dimensions (Units: mm)



DIP14                    SOP14

Standard ICs

BU4000B series

CMOS logic

# Series Standard
## BU4000B

The BU4000 Series are CMOS ICs featuring low voltage and low power consumption. The wide range of operating power supply voltages is compatible with the general-purpose 4000B Series, and when a 5V power supply voltage is used, the LS-TTL IC can be driven directly.
These ICs are available in SOP and SSOP packages as well as the standard DIP package.

●Features
1) Low power consumption.
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.

●Absolute maximum ratings (Ta = 25℃)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | $V_{DD}$ | 18 *1 | V |
| Input voltage | $V_{IN}$ | $-0.3 \sim V_{DD}+0.3$ | V |
| Power dissipation *2 | Pd | Please refer to specifications for individual package | mW |
| Storage temperature | Tstg | $-55 \sim 150$ | ℃ |

*1 For the BU4XXXBC type, $V_{DD}$ = 20 V.
*2 The values for the SOP and SSOP packages are the values when mounted on a glass epoxy PCB (50 mm x 50 mm x 1.6 mm).

●Recommended operating conditions (Ta = 25℃)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | $V_{DD}$ | $3 \sim 16$ * | V |
| Input voltage | $V_{IN}$ | $0 \sim V_{DD}$ | V |
| Operating temperature | Topr | $-40 \sim 85$ | ℃ |

* For the BU4XXXBC type, $V_{DD}$ = 3 to 18 V.
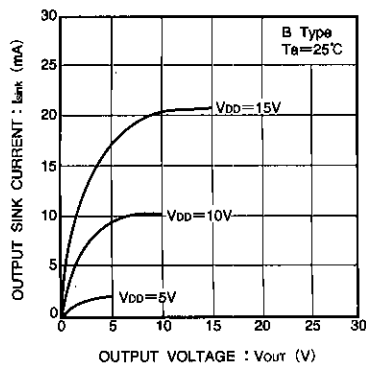
●Electrical characteristic curves



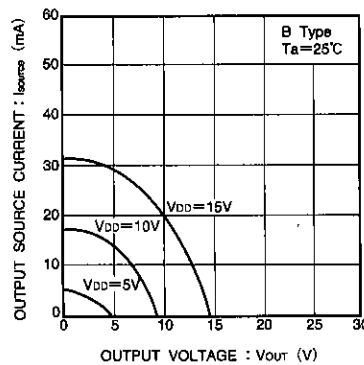Fig.1 Output sink current - output voltage characteristic



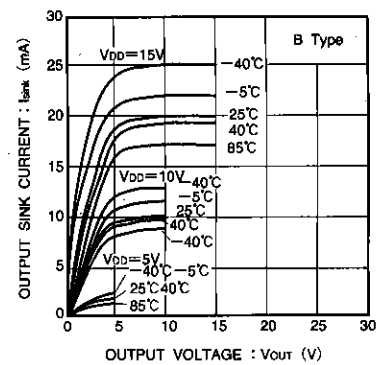Fig.2 Output source current - output voltage characteristic



Fig.3 Output SINK current - output voltage characteristic
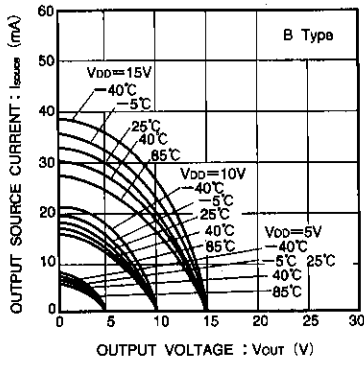
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Fig.4 Output source current - output voltage characteristic
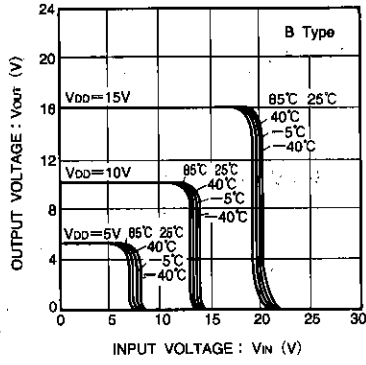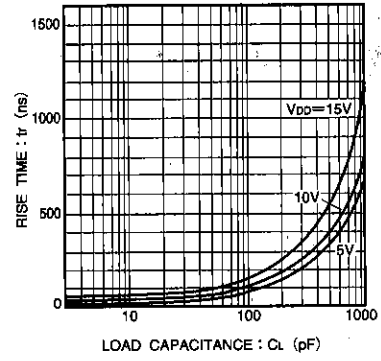
Fig.5 Output voltage - input voltage characteristic
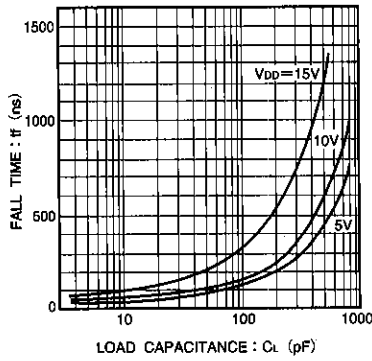
Fig.6 Rise time - load capacitance characteristic

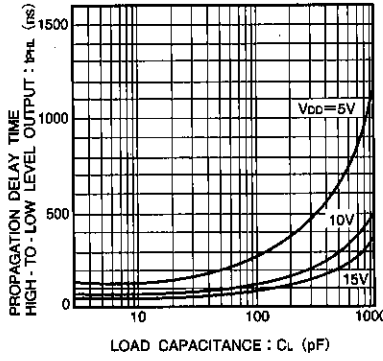Fig.7 Fall time - load capacitance characteristic

Fig.8 "H" to "L" propagation delay time - load capacitance characteristic
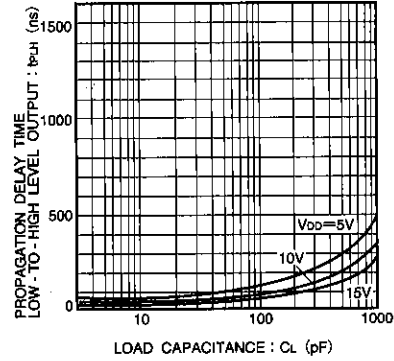
Fig.9 "L" to "H" propagation delay time - load capacitance characteristic
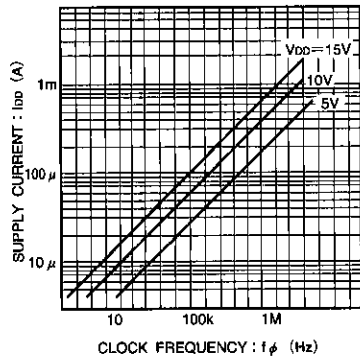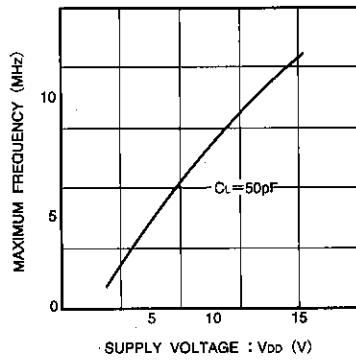
Fig.10 Supply current - clock frequency characteristic

Fig.11 Maximum clock frequency - power supply voltage characteristic

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