

STRUCTURE Silicon Monolithic Integrated Circuit

TYPE Quadruple 2 input Schmitt NANDS Gates

PRODUCT SERIES **BU4093B**  
**BU4093BF**  
**BU4093BFV**

FEATURES

- Wide operating power supply range (3[V]~16[V])
- High impedance input

○ ABSOLUTE MAXIMUM RATINGS (Ta=25[°C])

| Parameter                    | Symbol | Limit                | Unit         |
|------------------------------|--------|----------------------|--------------|
| Power Supply Voltage         | VDD    | (VSS-0.3)~(VSS+18.0) | V            |
| Power Dissipation            | Pd     | BU4081B              | 1180(*1)(*4) |
|                              |        | BU4081BF             | 610(*2)(*4)  |
|                              |        | BU4081BF             | 870(*2)(*4)  |
|                              |        | V                    |              |
| Supply current               | Iin    | ± 10                 | mA           |
| Operating temperature        | Topr   | -40~+85              | °C           |
| Storage temperature          | Tstg   | -55~+150             | °C           |
| Input Voltage                | Vin    | (VSS-0.3)~(VDD+0.3)  | V            |
| Maximum junction temperature | Tjmax  | 150                  | °C           |

• This product is designed for protection against radioactive rays.

(\*1) When used at Ta=25[°C] on above, value of above is reduced 9.5[mW] per 1[°C].

(\*2) When used at Ta=25[°C] on above, value of above is reduced 4.9[mW] per 1[°C].

(\*3) When used at Ta=25[°C] on above, value of above is reduced 7.0[mW] per 1[°C].

(\*4) Power dissipation is the value for mounting 70[mm]×[70mm]×1.6[mm] FR4 glass epoxy circuit board (copper foil area is 3% or less).

○ OPERATING CONDITION (Ta=-40~+85[°C])

| Parameter            | Symbol | Limit      | Unit |
|----------------------|--------|------------|------|
| Power Supply Voltage | VDD    | +3.0~+16.0 | V    |
| Input voltage        | VIN    | 0~VDD      | V    |

Status of this document

The Japanese version of this document is the official specification.

This translated version is intended only as a reference, to aid in understanding the official version.

If there are any differences between the original and translated versions of this document, the official Japanese language version takes priority.

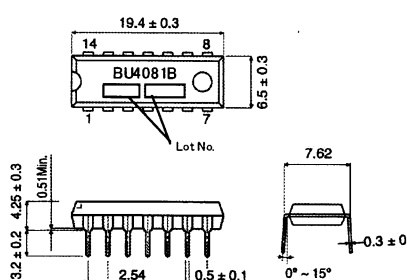
## ○ ELECTRICAL CHARACTERISTICS (unless otherwise noted, VSS=VEE=0[V], Ta=25[°C])

| Parameter          | Symbol | Standard Value |     |      | Unit | VDD[V] | Condition   |
|--------------------|--------|----------------|-----|------|------|--------|-------------|
|                    |        | MIN            | TYP | MAX  |      |        |             |
| Input "H" voltage  | VIH    | 3.5            | —   | —    | V    | 5      | —           |
|                    |        | 7.0            | —   | —    | V    | 10     |             |
|                    |        | 11.0           | —   | —    | V    | 15     |             |
| Input "L" voltage  | VIL    | —              | —   | 1.5  | V    | 5      | —           |
|                    |        | —              | —   | 3.0  | V    | 10     |             |
|                    |        | —              | —   | 4.0  | V    | 15     |             |
| Input "H" current  | IIH    | —              | —   | 0.3  | μA   | 15     | VIH=15[V]   |
| Input "L" current  | IIL    | —              | —   | -0.3 | μA   | 15     | VIL=0[V]    |
| Output "H" voltage | VOH    | 4.95           | —   | —    | V    | 5      | IO=0[mA]    |
|                    |        | 9.95           | —   | —    | V    | 10     |             |
|                    |        | 14.95          | —   | —    | V    | 15     |             |
| Output "L" voltage | VOL    | —              | —   | 0.05 | V    | 5      | IO=0[mA]    |
|                    |        | —              | —   | 0.05 | V    | 10     |             |
|                    |        | —              | —   | 0.05 | V    | 15     |             |
| Output "H" current | IOH    | -0.16          | —   | —    | mA   | 5      | VOH=4.6[V]  |
|                    |        | -0.4           | —   | —    | mA   | 10     | VOH=9.5[V]  |
|                    |        | -1.2           | —   | —    | mA   | 15     | VOH=13.5[V] |
| Output "L" current | IOL    | 0.44           | —   | —    | mA   | 5      | VOL=0.4[V]  |
|                    |        | 1.1            | —   | —    | mA   | 10     | VOL=0.5[V]  |
|                    |        | 3.0            | —   | —    | mA   | 15     | VOL=1.5[V]  |
| Supply current     | IDD    | —              | —   | 1    | μA   | 5      | VIN=GND,VDD |
|                    |        | —              | —   | 2    | μA   | 10     |             |
|                    |        | —              | —   | 4    | μA   | 15     |             |
| Input capacitance  | CIN    | —              | 5   | —    | pF   | —      | —           |

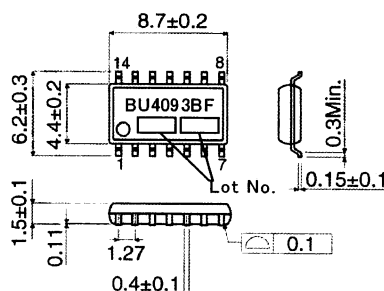
## ○ Switching Characteristics (unless otherwise noted, Ta=25[°C], VSS=VEE=0[V], RL=10[kΩ], CL=50[pF])

| Parameter                       | Symbol | Standard Value |     |     | Unit | VDD[V] | Condition |
|---------------------------------|--------|----------------|-----|-----|------|--------|-----------|
|                                 |        | MIN            | TYP | MAX |      |        |           |
| Output rising time              | tTLH   | —              | 180 | —   | ns   | 5      | —         |
|                                 |        | —              | 90  | —   | ns   | 10     |           |
|                                 |        | —              | 65  | —   | ns   | 15     |           |
| Output falling time             | tTHL   | —              | 100 | —   | ns   | 5      | —         |
|                                 |        | —              | 50  | —   | ns   | 10     |           |
|                                 |        | —              | 40  | —   | ns   | 15     |           |
| Propagation delay time<br>L → H | tPLH   | —              | 160 | —   | ns   | 5      | —         |
|                                 |        | —              | 65  | —   | ns   | 10     |           |
|                                 |        | —              | 50  | —   | ns   | 15     |           |
| Propagation delay time<br>H → L | tPHL   | —              | 160 | —   | ns   | 5      | —         |
|                                 |        | —              | 65  | —   | ns   | 10     |           |
|                                 |        | —              | 50  | —   | %    | 5      |           |

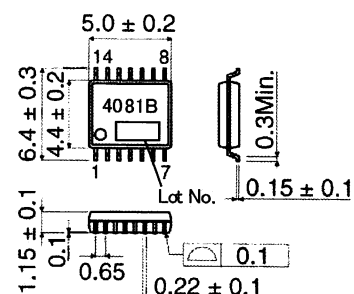
## ○ PHYSICAL DIMENSIONS



BU4081B(DIP14)(UNIT:[mm])

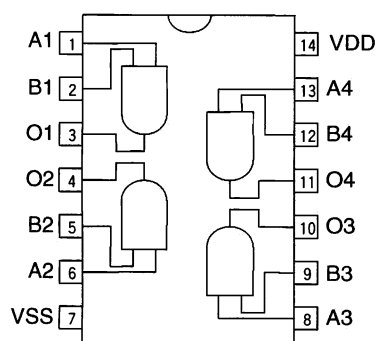


BU4081BF(SOP14)(UNIT:[mm])



BU4081BFV(SSOP-B14)(UNIT:[mm])

## ○ BLOCK DIAGRAM



## ○ PIN DESCRIPTION

| Pin number | Pin name |
|------------|----------|
| 1          | A1       |
| 2          | B1       |
| 3          | O1       |
| 4          | O2       |
| 5          | B2       |
| 6          | A2       |
| 7          | VSS      |
| 8          | A3       |
| 9          | B3       |
| 10         | O3       |
| 11         | O4       |
| 12         | B4       |
| 13         | A4       |
| 14         | VDD      |

## ○ NOTES FOR USE

### (1) Absolute maximum ratings

Exceeding the absolute maximum ratings, including applied voltage and operating temperature range, may damage or destroy the IC. Since the cause of the damage cannot be conclusively identified (as, for example, a short or open mode), be sure to take appropriate physical safety measures, such as incorporating fuses, whenever a special mode anticipated to exceed absolute maximum ratings is employed.

### (2) External voltage at input terminal

VDD+0.3[V], VSS-0.3[V] can be input led without characteristics deterioration and destruction. However the circuit operation is not guaranteed. Please use within recommended operating conditions.

### (3) Treatment about input of unused circuit

Redundancy current and oscillation may occur, so untreated input should be connected to VDD or VSS. At connection, it is better to connect resistance (about 100k $\Omega$ ).

### (4) Power Dissipation

It the IC is used out of this power dissipation area, the faulty operation or reduction of current characteristics may occur due to the rise of IC temperature. Also, be sure to Use this IC within a power dissipation range while also allowing enough margins.

(5) Mounting errors

Mounting errors, such as incorrect positioning or orientation, may destroy the device.

(6) Electromagnetic fields

Use in strong electromagnetic fields may cause malfunctions. Be careful operating in electromagnetic fields.

(7) Treatment of IC

Stress (camber, bend etc) may cause characteristic change due to piezo electric effect.

Pay attention to stress.

(8) Latch up

Please pay attention to the deterioration and destruction by parasitic element action and latch up that occurs when excessive noise, surge or negative voltage is loaded at the normal operation.

(9) Test with set PCB

When you connect capacitor to low impedance terminal. You should discharge to avoid stress under IC.

Also at attachment and detachment to jig in testing line, its power supply should be "OFF" .

Moreover for static electricity, please set ground to assembly line, and pay enough attention at conveyance on storage.

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