

General-purpose CMOS Logic IC Series (BU4S,BU4000B Series)

High Voltage CMOS Logic ICs <Logic Gate>



BU4001B/F,BU4011B/F/FV,BU4030B/F,BU4070B/F,
BU4081B/F/FV,BU4093B/F/FV,BU4069UB/F/FV,BU4584B/F/FV

No.11050EBT03

●Description

BU4001B series ICs are 2-input positive logic NOR gates, each with four built-in circuits. A buffer achieved by an inverter added at the gate output improves the input / output propagation characteristics and minimizes variation in the propagation time caused by an increase in the load capacitance. BU4011B series ICs are 2-input positive logic NAND gates. Four circuits are contained on a single chip. An inverter-based buffer is included at the gate output, enabling improved input / output propagation characteristics, and an increased load capacitance minimizes fluctuations in the propagation time. BU4030B and BU4070B series ICs are exclusive OR gates, each with four built-in circuits. An inverter-based buffer was incorporated at the gate output for enhanced I/O voltage characteristics, and the load capacitance has been increased in order to minimize fluctuations in the propagation time. BU4081B series are 2-input positive logic AND gates with four circuits mounted on a single chip. An inverter-type buffer was added to the gate output, improving input/output transmission speed, and an increased load capacitance suppresses fluctuations in the transmission time. BU4093B series ICs are 4-circuit, 2-input NAND gates whose input pins all have a Schmitt trigger function. BU4069UB series ICs are 6-circuit inverters with no buffers. A single-stage gate configuration reduces propagation time. BU4584B series ICs are inverter-type Schmitt trigger circuits, each incorporating 6 circuits in a single chip.

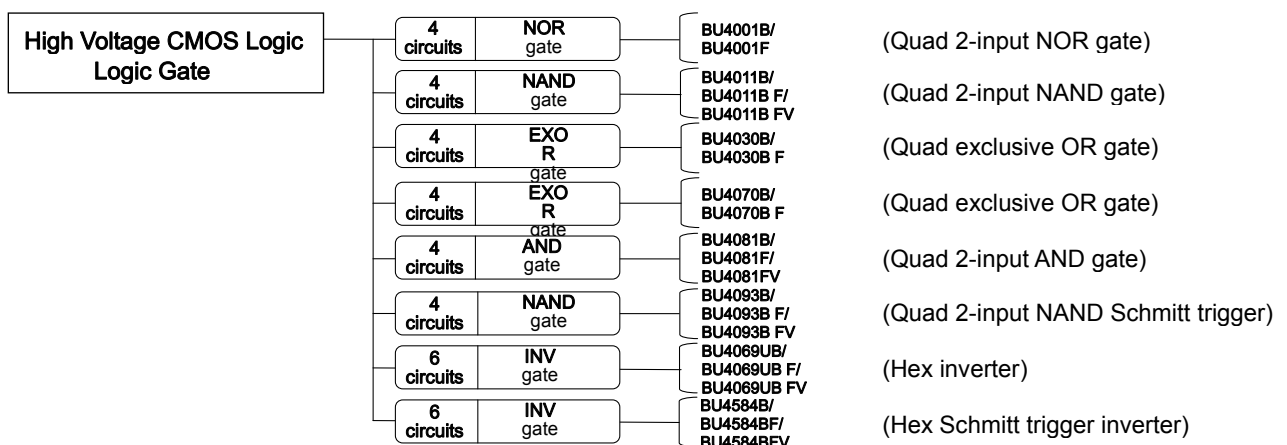
●Features

- 1) Low power consumption
- 2) Broad operating supply voltage range: 3V to 16V
- 3) High input impedance
- 4) High fan out
- 5) L-TTL2 and LS-TTL1 inputs can be directly driven
- 6) All outputs are equipped with buffers (except for BU4069UB)

●Applications

These products are suitable for applications requiring low power consumption and a high degree of noise tolerance
 The BU4030B/BU4070B series can be used in digital comparators and parity circuits
 The BU4093B series are suitable as line receivers, waveform shaping and multi-vibrators, etc.
 The BU4584B series can be used in waveform shaping circuits for inputs with a slow rise time and fall time

●Lineup



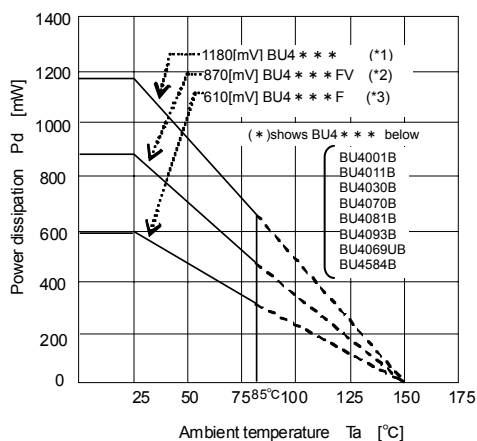
● Absolute Maximum Ratings

| Parameter | Symbol | Limit | | | | | | | Unit |
|------------------------------|--------|-----------------|---------|------------------|---------|---------|----------|---------|------|
| | | BU4001B | BU4011B | BU4030B /BU4070B | BU4081B | BU4093B | BU4069UB | BU4584B | |
| Power Supply Voltage | VDD | -0.3 to 18 | | | | | | | V |
| Supply current | Iin | ±10 | | | | | | | mA |
| Operating temperature | Topr | -40 to 85 | | | | | | | °C |
| Storage temperature | Tstg | -55 to 150 | | | | | | | °C |
| Input Voltage | VIN | -0.3 to VDD+0.3 | | | | | | | V |
| Maximum junction temperature | Tjmax | 150 | | | | | | | °C |

● Recommended Operating Conditions

| Parameter | Symbol | Limit | | | | | | | Unit |
|------------------------|--------|----------|---------|------------------|---------|---------|----------|---------|------|
| | | BU4001B | BU4011B | BU4030B /BU4070B | BU4081B | BU4093B | BU4069UB | BU4584B | |
| Operating Power Supply | VDD | 3 to 16 | | | | | | | V |
| Input Voltage | VIN | 0 to VDD | | | | | | | V |

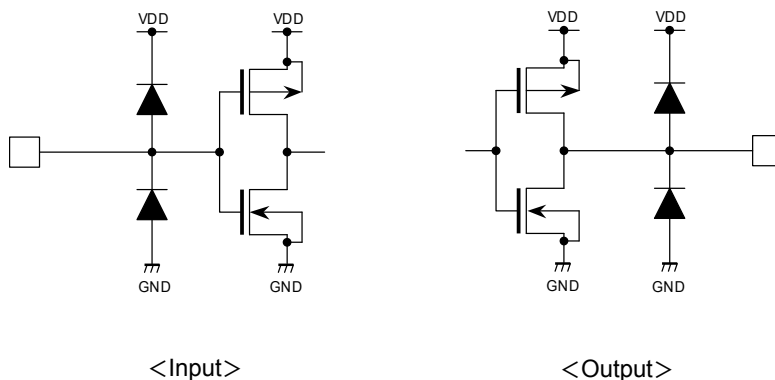
● Thermal Derating Curve



| (*1) | (*2) | (*3) | UNIT |
|------|------|------|-------|
| 9.5 | 7.0 | 4.9 | mW/°C |

When used at Ta=25[°C] or above, values of above are reduced per 1[°C].
 Allowable loss is the value for mounting 70[mm] x 70[mm] x 1.6[mm] FR4 glass epoxy circuit board (copper foil area is 3% or less).

● Input / Output Equivalent Circuits



● Electrical Characteristics (BU4001B) (Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|--------------------|--------|----------------|-----|------|------|---------------|------------|--------|
| | | | MIN | TYP | MAX | | | | |
| DC Characteristics | Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 1 |
| | | | 7.0 | — | — | | 10 | | 2 |
| | | | 11.0 | — | — | | 15 | | 3 |
| | Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 1 |
| | | | — | — | 3.0 | | 10 | | 2 |
| | | | — | — | 4.0 | | 15 | | 3 |
| | 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] | 1 |
| | | | 9.95 | — | — | | 10 | | 2 |
| | | | 14.95 | — | — | | 15 | | 3 |
| | Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 1 |
| | | | — | — | 0.05 | | 10 | | 2 |
| | | | — | — | 0.05 | | 15 | | 3 |
| | Output "H" current | IOH | -0.16 | — | — | mA | 5 | VOH=4.6[V] | 4 |
| -0.4 | | | — | — | 10 | | VOH=9.5[V] | | |
| -1.2 | | | — | — | 15 | | VOH=13.5[V] | | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 5 | |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — | |
| | | — | — | 2 | | 10 | | | |
| | | — | — | 4 | | 15 | | | |

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|---------------------------|--------------------------------------|--------|----------------|-----|-----|------|--------|-----------|--------|
| | | | MIN | TYP | MAX | | | | |
| Switching Characteristics | Output rising time | tTLH | — | 180 | — | ns | 5 | — | 6 |
| | | | — | 90 | — | | 10 | | |
| | | | — | 65 | — | | 15 | | |
| | Output falling time | tTHL | — | 100 | — | ns | 5 | — | 7 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "L" to "H" Propagation delay time | tPLH | — | 90 | — | ns | 5 | — | 8 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "H" to "L" Propagation delay time | tPHL | — | 90 | — | ns | 5 | — | 9 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| Input capacitance | CIN | — | 5 | — | pF | — | — | — | |

● Electrical Characteristics (BU4011B) (Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|--------------------|-----------------|----------------|-----|------|------|---------------|------------|--------|
| | | | MIN | TYP | MAX | | | | |
| DC Characteristics | Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 10 |
| | | | 7.0 | — | — | | 10 | | 11 |
| | | | 11.0 | — | — | | 15 | | 12 |
| | Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 10 |
| | | | — | — | 3.0 | | 10 | | 11 |
| | | | — | — | 4.0 | | 15 | | 12 |
| | Input "H" current | I _{IH} | — | — | 0.3 | μA | 15 | VIH=15[V] | — |
| | Input "L" current | I _{IL} | — | — | -0.3 | μA | 15 | VIL=0[V] | — |
| | Output "H" voltage | VOH | 4.95 | — | — | V | 5 | IO=0[mA] | 10 |
| | | | 9.95 | — | — | | 10 | | 11 |
| | | | 14.95 | — | — | | 15 | | 12 |
| | Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 10 |
| | | | — | — | 0.05 | | 10 | | 11 |
| | | | — | — | 0.05 | | 15 | | 12 |
| | Output "H" current | IOH | -0.16 | — | — | mA | 5 | VOH=4.6[V] | 13 |
| -0.4 | | | — | — | 10 | | VOH=9.5[V] | | |
| -1.2 | | | — | — | 15 | | VOH=13.5[V] | | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 14 | |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — | |
| | | — | — | 2 | | 10 | | | |
| | | — | — | 4 | | 15 | | | |

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|---------------------------|-----------------------------------|------------------|----------------|-----|-----|------|--------|-----------|--------|
| | | | MIN | TYP | MAX | | | | |
| Switching Characteristics | Output rising time | t _{TLH} | — | 180 | — | ns | 5 | — | 15 |
| | | | — | 90 | — | | 10 | | |
| | | | — | 65 | — | | 15 | | |
| | Output falling time | t _{THL} | — | 100 | — | ns | 5 | — | 16 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "L" to "H" Propagation delay time | t _{PLH} | — | 90 | — | ns | 5 | — | 17 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "H" to "L" Propagation delay time | t _{PHL} | — | 90 | — | ns | 5 | — | 18 |
| — | | | 50 | — | 10 | | | | |
| — | | | 40 | — | 15 | | | | |
| Input capacitance | C _{IN} | — | 5 | — | pF | — | — | — | |

●Electrical Characteristics(BU4030B/ BU4070B)(Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|--------------------|-----------------|----------------|-----|------|------|---------------|------------|--------|
| | | | MIN | TYP | MAX | | | | |
| DC Characteristics | Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 19 |
| | | | 7.0 | — | — | | 10 | | 20 |
| | | | 11.0 | — | — | | 15 | | 21 |
| | Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 19 |
| | | | — | — | 3.0 | | 10 | | 20 |
| | | | — | — | 4.0 | | 15 | | 21 |
| | Input "H" current | I _{IH} | — | — | 0.3 | μA | 15 | VIH=15[V] | — |
| | Input "L" current | I _{IL} | — | — | -0.3 | μA | 15 | VIL=0[V] | — |
| | Output "H" voltage | VOH | 4.95 | — | — | V | 5 | IO=0[mA] | 19 |
| | | | 9.95 | — | — | | 10 | | 20 |
| | | | 14.95 | — | — | | 15 | | 21 |
| | Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 19 |
| | | | — | — | 0.05 | | 10 | | 20 |
| | | | — | — | 0.05 | | 15 | | 21 |
| | Output "H" current | IOH | -0.16 | — | — | mA | 5 | VOH=4.6[V] | 22 |
| -0.4 | | | — | — | 10 | | VOH=9.5[V] | | |
| -1.2 | | | — | — | 15 | | VOH=13.5[V] | | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 23 | |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — | |
| | | — | — | 2 | | 10 | | | |
| | | — | — | 4 | | 15 | | | |

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|---------------------------|--------------------------------------|------------------|----------------|-----|-----|------|--------|-----------|--------|
| | | | MIN | TYP | MAX | | | | |
| Switching Characteristics | Output rising time | t _{TLH} | — | 180 | — | ns | 5 | — | 24 |
| | | | — | 90 | — | | 10 | | |
| | | | — | 65 | — | | 15 | | |
| | Output falling time | t _{THL} | — | 100 | — | ns | 5 | — | 25 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "L" to "H" Propagation delay time | t _{PLH} | — | 90 | — | ns | 5 | — | 26 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "H" to "L" Propagation delay time | t _{PHL} | — | 90 | — | ns | 5 | — | 27 |
| — | | | 50 | — | 10 | | | | |
| — | | | 40 | — | 15 | | | | |
| Input capacitance | C _{IN} | — | 5 | — | pF | — | — | — | |

● Electrical Characteristics(BU4081B)(Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|--------------------|--------|----------------|-----|------|------|---------------|------------|--------|
| | | | MIN | TYP | MAX | | | | |
| DC Characteristics | Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 28 |
| | | | 7.0 | — | — | | 10 | | 29 |
| | | | 11.0 | — | — | | 15 | | 30 |
| | Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 28 |
| | | | — | — | 3.0 | | 10 | | 29 |
| | | | — | — | 4.0 | | 15 | | 30 |
| | 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] | 28 |
| | | | 9.95 | — | — | | 10 | | 29 |
| | | | 14.95 | — | — | | 15 | | 30 |
| | Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 28 |
| | | | — | — | 0.05 | | 10 | | 29 |
| | | | — | — | 0.05 | | 15 | | 30 |
| | Output "H" current | IOH | -0.16 | — | — | mA | 5 | VOH=4.6[V] | 31 |
| -0.4 | | | — | — | 10 | | VOH=9.5[V] | | |
| -1.2 | | | — | — | 15 | | VOH=13.5[V] | | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 32 | |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — | |
| | | — | — | 2 | | 10 | | | |
| | | — | — | 4 | | 15 | | | |

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|---------------------------|--------------------------------------|--------|----------------|-----|-----|------|--------|-----------|--------|
| | | | MIN | TYP | MAX | | | | |
| Switching Characteristics | Output rising time | tTLH | — | 180 | — | ns | 5 | — | 33 |
| | | | — | 90 | — | | 10 | | |
| | | | — | 65 | — | | 15 | | |
| | Output falling time | tTHL | — | 100 | — | ns | 5 | — | 34 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "L" to "H" Propagation delay time | tPLH | — | 160 | — | ns | 5 | — | 35 |
| | | | — | 65 | — | | 10 | | |
| | | | — | 50 | — | | 15 | | |
| | "H" to "L" Propagation delay time | tPHL | — | 160 | — | ns | 5 | — | 36 |
| — | | | 65 | — | 10 | | | | |
| — | | | 50 | — | 15 | | | | |
| Input capacitance | CIN | — | 5 | — | pF | — | — | — | |

●Electrical Characteristics(BU4093B)(Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|-----------------|----------------|-----|------|------|--------|---------------|--------|
| | | MIN | TYP | MAX | | | | |
| Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 37 |
| | | 7.0 | — | — | | 10 | | 38 |
| | | 11.0 | — | — | | 15 | | 39 |
| Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 37 |
| | | — | — | 3.0 | | 10 | | 38 |
| | | — | — | 4.0 | | 15 | | 39 |
| Input "H" current | I _{IH} | — | — | 0.3 | μA | 15 | VIH=15[V] | — |
| Input "L" current | I _{IL} | — | — | -0.3 | μA | 15 | VIL=0[V] | — |
| Output "H" voltage | VOH | 4.95 | — | — | V | 5 | IO=0[mA] | 37 |
| | | 9.95 | — | — | | 10 | | 38 |
| | | 14.95 | — | — | | 15 | | 39 |
| Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 37 |
| | | — | — | 0.05 | | 10 | | 38 |
| | | — | — | 0.05 | | 15 | | 39 |
| Output "H" current | IOH | -0.44 | — | — | mA | 5 | VOH=4.6[V] | 40 |
| | | -1.1 | — | — | | 10 | VOH=9.5[V] | |
| | | -3.0 | — | — | | 15 | VOH=13.5[V] | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 41 |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — |
| | | — | — | 2 | | 10 | | |
| | | — | — | 4 | | 15 | | |
| Hysteresis voltage | VH | 0.17 | — | 0.39 | μA | 5 | — | — |
| | | 0.25 | — | 0.60 | | 10 | | |
| | | 0.33 | — | 0.90 | | 15 | | |

| Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|--------------------------------------|------------------|----------------|-----|-----|------|--------|-----------|--------|
| | | MIN | TYP | MAX | | | | |
| Output rising time | t _{TLH} | — | 100 | — | ns | 5 | — | 42 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| Output falling time | t _{THL} | — | 100 | — | ns | 5 | — | 43 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| "L" to "H" Propagation delay time | t _{PLH} | — | 125 | — | ns | 5 | — | 44 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| "H" to "L" Propagation delay time | t _{PHL} | — | 125 | — | ns | 5 | — | 45 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| Input capacitance | C _{IN} | — | 5 | — | pF | — | — | — |

● Electrical Characteristics (BU4069UB) (Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|--------------------|--------|----------------|-----|------|------|---------------|------------|--------|
| | | | MIN | TYP | MAX | | | | |
| DC Characteristics | Input "H" voltage | VIH | 4.0 | | — | V | 5 | — | 46 |
| | | | 8.0 | | — | | 10 | | 47 |
| | | | 12.5 | | — | | 15 | | 48 |
| | Input "L" voltage | VIL | — | — | 1.0 | V | 5 | — | 46 |
| | | | — | — | 2.0 | | 10 | | 47 |
| | | | — | — | 2.5 | | 15 | | 48 |
| | 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] | 46 |
| | | | 9.95 | — | — | | 10 | | 47 |
| | | | 14.95 | — | — | | 15 | | 48 |
| | Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 46 |
| | | | — | — | 0.05 | | 10 | | 47 |
| | | | — | — | 0.05 | | 15 | | 48 |
| | Output "H" current | IOH | -0.44 | — | — | mA | 5 | VOH=4.6[V] | 49 |
| -1.1 | | | — | — | 10 | | VOH=9.5[V] | | |
| -3.0 | | | — | — | 15 | | VOH=13.5[V] | | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 50 | |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | | |
| Static supply current | IDD | — | — | 1 | μA | 5 | VI=VDD or GND | — | |
| | | — | — | 2 | | 10 | | | |
| | | — | — | 4 | | 15 | | | |

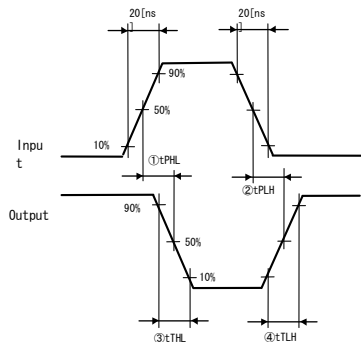
| | Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|---------------------------|-----------------------------------|--------|----------------|-----|-----|------|--------|-----------|--------|
| | | | MIN | TYP | MAX | | | | |
| Switching Characteristics | Output rising time | tTLH | — | 180 | — | ns | 5 | — | 51 |
| | | | — | 90 | — | | 10 | | |
| | | | — | 65 | — | | 15 | | |
| | Output falling time | tTHL | — | 100 | — | ns | 5 | — | 52 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "L" to "H" Propagation delay time | tPLH | — | 90 | — | ns | 5 | — | 53 |
| | | | — | 50 | — | | 10 | | |
| | | | — | 40 | — | | 15 | | |
| | "H" to "L" Propagation delay time | tPHL | — | 65 | — | ns | 5 | — | 54 |
| — | | | 40 | — | 10 | | | | |
| — | | | 30 | — | 15 | | | | |
| Input capacitance | CIN | — | 5 | — | pF | — | — | — | |

● Electrical Characteristics (BU4584B) (Unless otherwise noted, VSS=0V, Ta=25°C, CL=50pF)

| Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|-----------------------|-----------------|----------------|-----|------|------|--------|-------------|--------|
| | | MIN | TYP | MAX | | | | |
| Input "H" voltage | VIH | 3.5 | — | — | V | 5 | — | 55 |
| | | 7.0 | — | — | | 10 | | 56 |
| | | 11.0 | — | — | | 15 | | 57 |
| Input "L" voltage | VIL | — | — | 1.5 | V | 5 | — | 55 |
| | | — | — | 3.0 | | 10 | | 56 |
| | | — | — | 4.0 | | 15 | | 57 |
| Input "H" current | I _{IH} | — | — | 0.3 | μA | 15 | VIH=15[V] | — |
| Input "L" current | I _{IL} | — | — | -0.3 | μA | 15 | VIL=0[V] | — |
| Output "H" voltage | VOH | 4.95 | — | — | V | 5 | IO=0[mA] | 55 |
| | | 9.95 | — | — | | 10 | | 56 |
| | | 14.95 | — | — | | 15 | | 57 |
| Output "L" voltage | VOL | — | — | 0.05 | V | 5 | IO=0[mA] | 55 |
| | | — | — | 0.05 | | 10 | | 56 |
| | | — | — | 0.05 | | 15 | | 57 |
| Output "H" current | IOH | -0.44 | — | — | mA | 5 | VOH=4.6[V] | 58 |
| | | -1.1 | — | — | | 10 | VOH=9.5[V] | |
| | | -3.0 | — | — | | 15 | VOH=13.5[V] | |
| Output "L" current | IOL | 0.44 | — | — | mA | 5 | VOL=0.4[V] | 59 |
| | | 1.1 | — | — | | 10 | VOL=0.5[V] | |
| | | 3.0 | — | — | | 15 | VOL=1.5[V] | |
| Static supply current | IDD | — | — | 1 | μA | 5 | — | — |
| | | — | — | 2 | | 10 | | |
| | | — | — | 4 | | 15 | | |
| Hysteresis voltage | VH | 0.15 | — | 0.6 | μA | 5 | — | — |
| | | 0.25 | — | 1.0 | | 10 | | |
| | | 0.40 | — | 1.5 | | 15 | | |
| Input capacitance | CIN | — | 5 | — | pF | — | — | — |

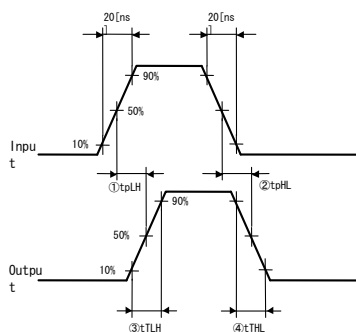
| Parameter | Symbol | Standard Value | | | Unit | VDD[V] | Condition | Fig.No |
|--------------------------------------|------------------|----------------|-----|-----|------|--------|-----------|--------|
| | | MIN | TYP | MAX | | | | |
| Output rising time | t _{TLH} | — | 100 | — | ns | 5 | — | 60 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| Output falling time | t _{THL} | — | 100 | — | ns | 5 | — | 61 |
| | | — | 50 | — | | 10 | | |
| | | — | 40 | — | | 15 | | |
| "L" to "H" Propagation delay time | t _{PLH} | — | 125 | — | ns | 5 | — | 62 |
| | | — | 60 | — | | 10 | | |
| | | — | 50 | — | | 15 | | |
| "H" to "L" Propagation delay time | t _{PHL} | — | 125 | — | ns | 5 | — | 63 |
| | | — | 60 | — | | 10 | | |
| | | — | 50 | — | | 15 | | |

● Switching Characteristics



Description of Symbols

- (1) tPHL: Time up to 50% of rise time of input waveform
 ~ 50% of fall time of output waveform
- (2) tPLH: Time up to 50% of fall time of input waveform
 ~ 50% of rise time of output waveform
- (3) tTHL: Time up to 90% ~ 10% of fall time of output waveform
- (4) tTLH: Time up to 10% ~ 90% of rise time of output waveform



Description of Symbols

- (1) tPLH: Time up to 50% of rise time of input waveform
 ~50% of rise time of output waveform
- (2) tPHL: Time up to 50% of fall time of input waveform
 ~ 50% of fall time of output waveform
- (3) tTLH: Time up to 10% ~ 90% of rise time of output waveform
- (4) tTHL: Time up to 90% ~ 10% of fall time of output waveform

● Electrical Characteristics Curves (BU4001B)

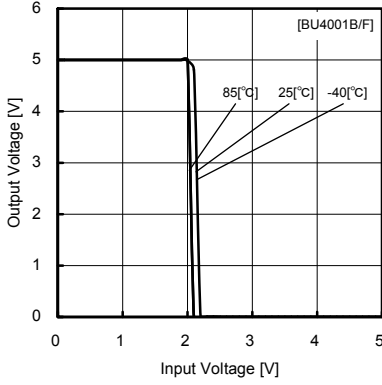


Fig. 1
 Output voltage—Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

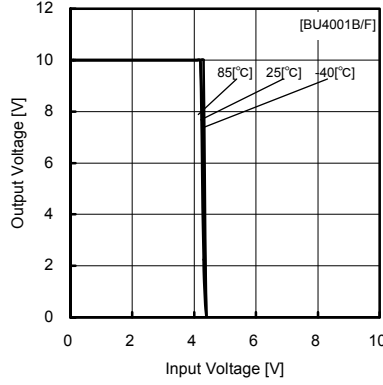


Fig. 2
 Output voltage—Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

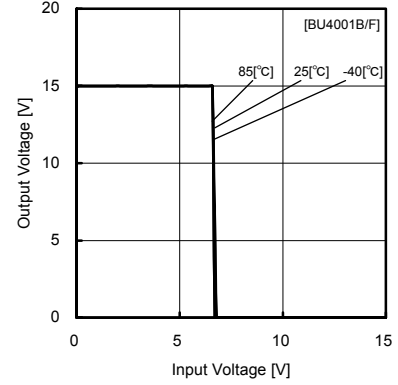


Fig. 3
 Output voltage—Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

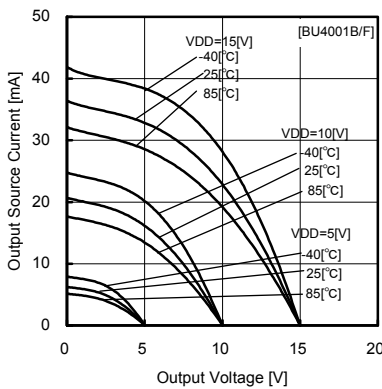


Fig. 4
 Output source current—voltage characteristics

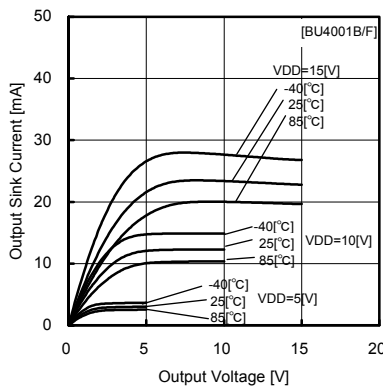


Fig. 5
 Output sink current—voltage characteristics

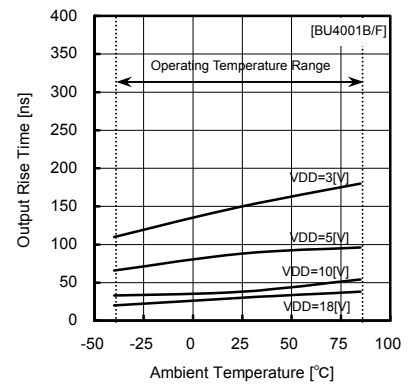


Fig. 6
 Rising time t_{TLH}

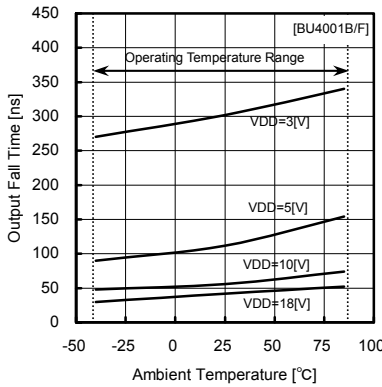


Fig. 7
 Falling time t_{THL}

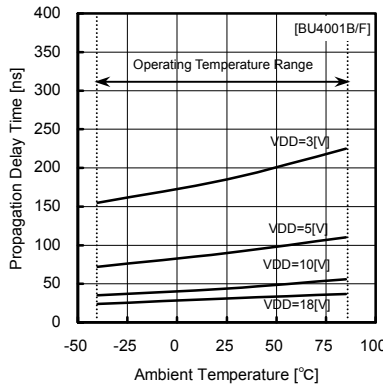


Fig. 8
 Rising propagation delay t_{PLH}

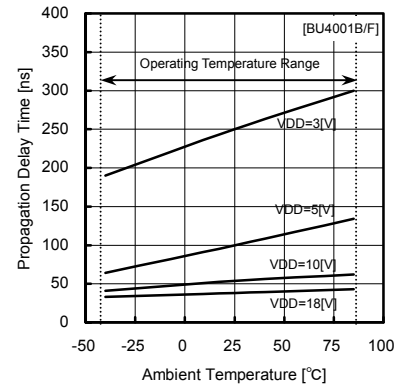


Fig. 9
 Falling propagation delay t_{PHL}

● Electrical Characteristics Curves (BU4011B)

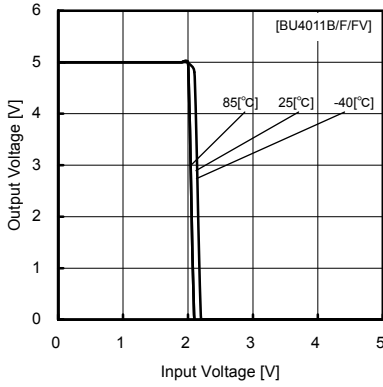


Fig. 10
 Output voltage–Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

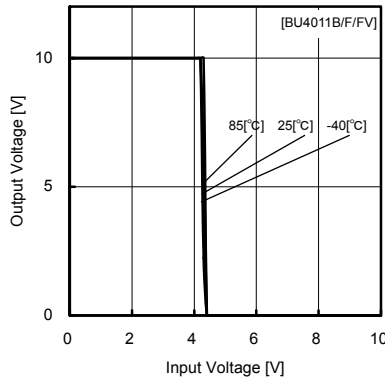


Fig. 11
 Output voltage–Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

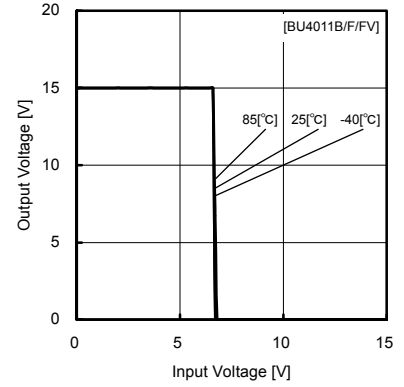


Fig. 12
 Output voltage–Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

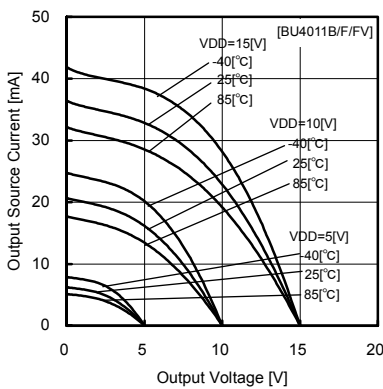


Fig. 13
 Output source current–voltage characteristics

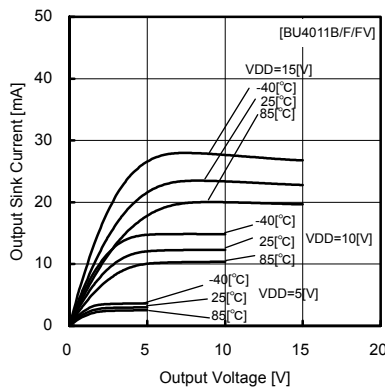


Fig. 14
 Output sink current–voltage characteristics

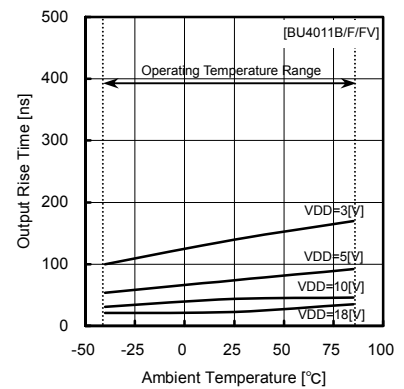


Fig. 15
 Rising time tTLH

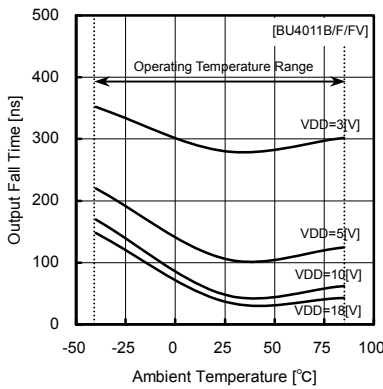


Fig. 16
 Falling time tTHL

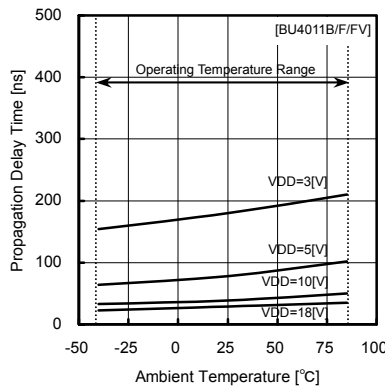


Fig. 17
 Rising propagation delay tPLH

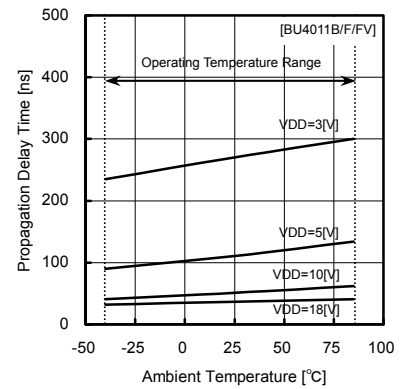


Fig. 18
 Falling propagation delay tPHL

● Electrical Characteristics Curves (BU4030B / BU4070B)

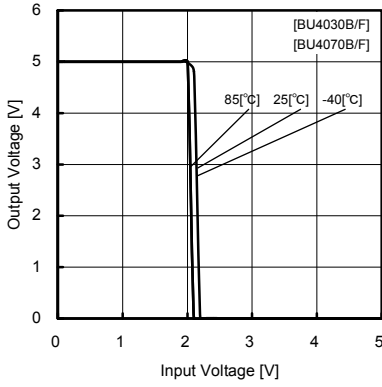


Fig.19
 Output voltage—Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

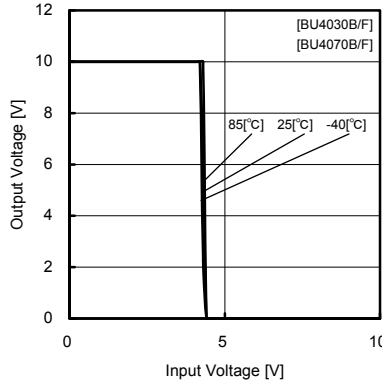


Fig.20
 Output voltage—Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

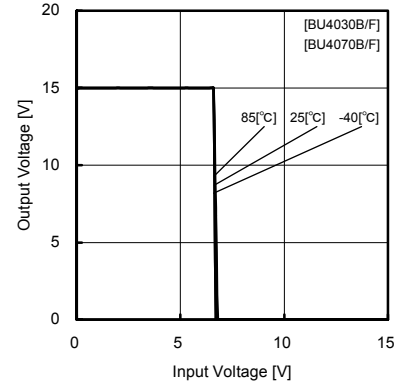


Fig.21
 Output voltage—Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

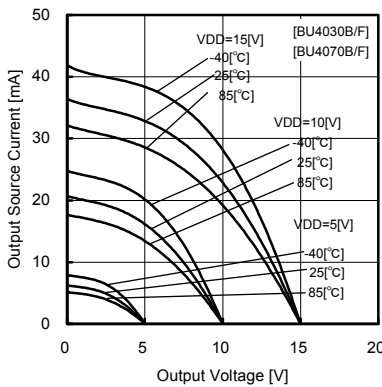


Fig.22
 Output source current—voltage characteristics

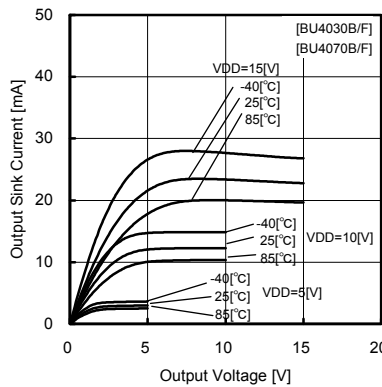


Fig.23
 Output sink current—voltage characteristics

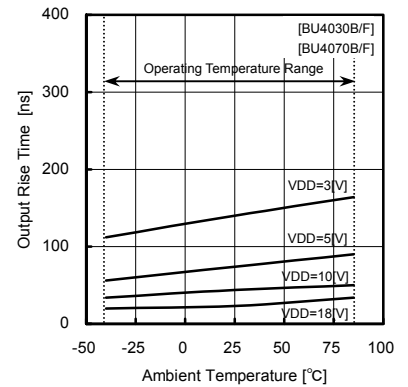


Fig.24
 Rising time tTLH

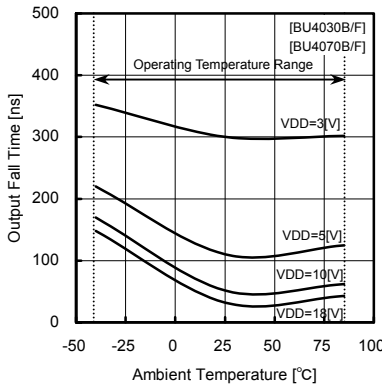


Fig.25
 Falling time tTHL

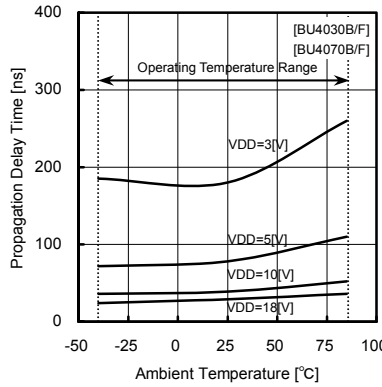


Fig.26
 Rising propagation delay tPLH

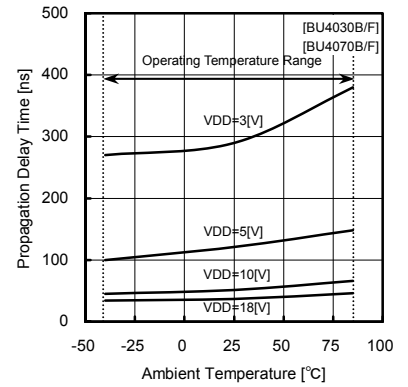


Fig.27
 Falling propagation delay tPHL

● Electrical Characteristics Curves (BU4081B)

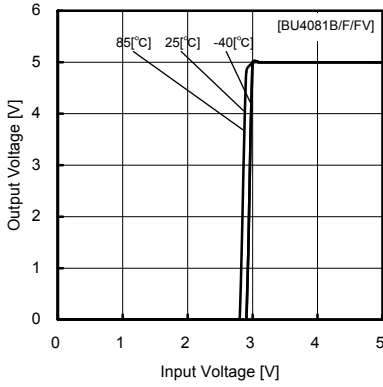


Fig. 28
 Output voltage—Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

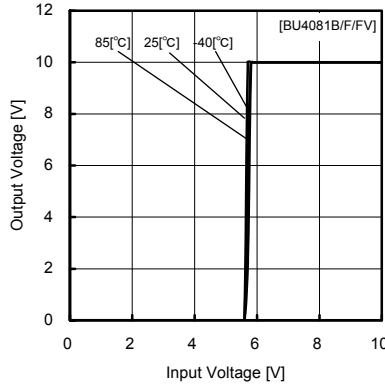


Fig. 29
 Output voltage—Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

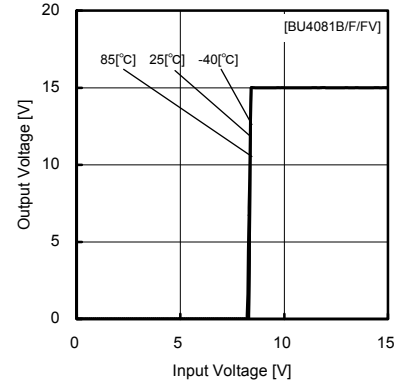


Fig. 30
 Output voltage—Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

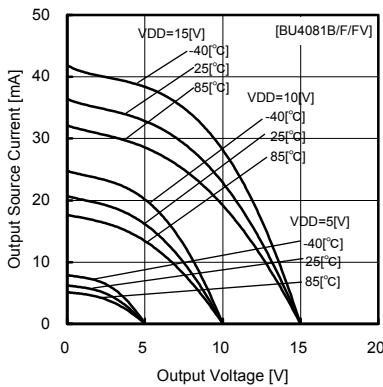


Fig. 31
 Output source current—voltage characteristics

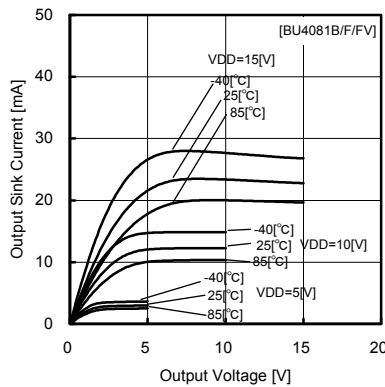


Fig. 32
 Output sink current—voltage characteristics

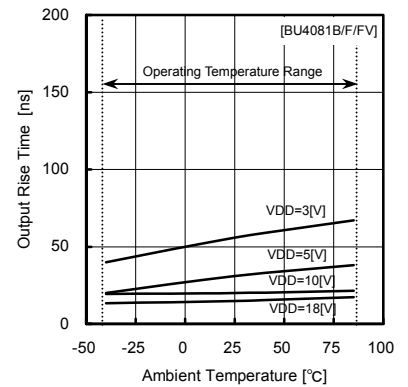


Fig. 33
 Rising time tTLH

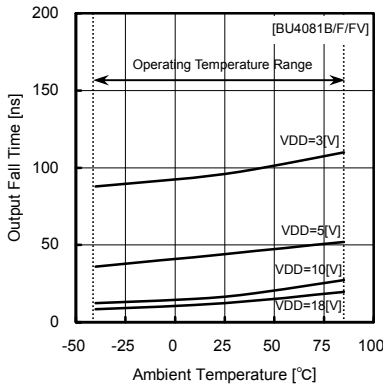


Fig. 34
 Falling time tTHL

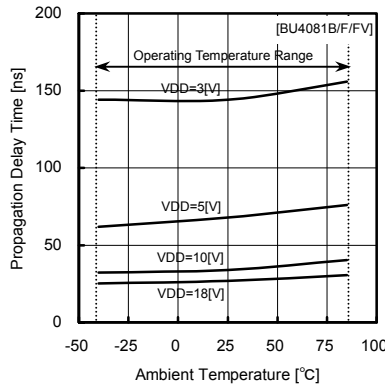


Fig. 35
 Rising propagation delay tPLH

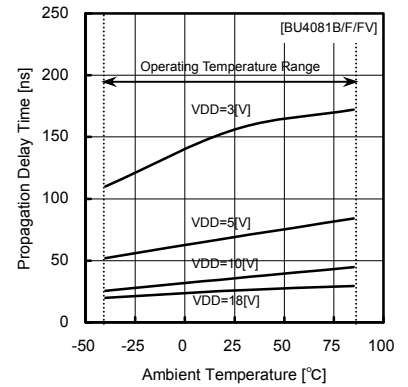


Fig. 36
 Falling propagation delay tPHL

● Electrical Characteristics Curves (BU4093B)

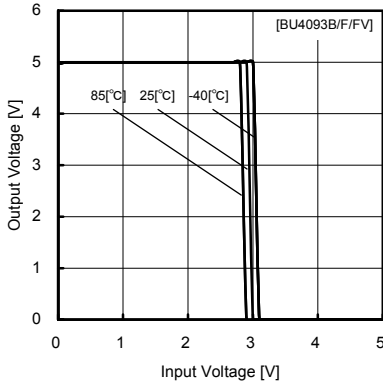


Fig. 37
 Output voltage - Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

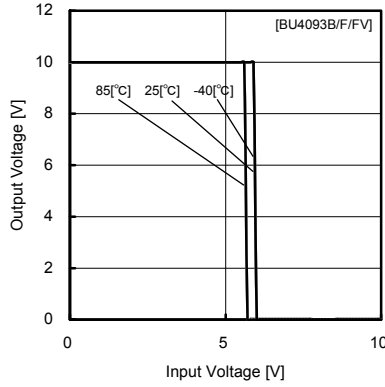


Fig. 38
 Output voltage - Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

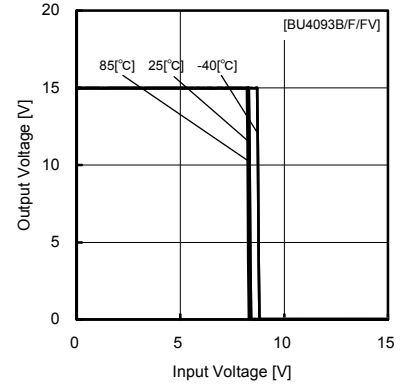


Fig. 39
 Output voltage - Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

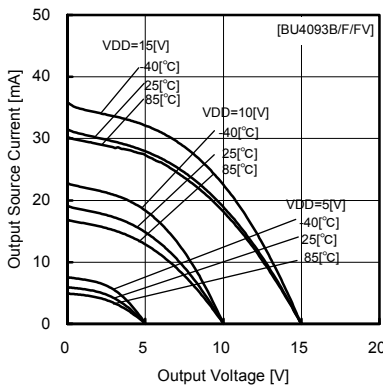


Fig. 40
 Output source current - voltage characteristics

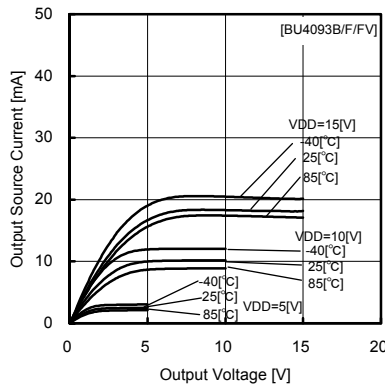


Fig. 41
 Output sink current - voltage characteristics

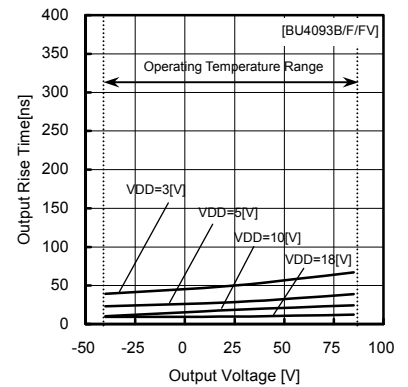


Fig. 42
 Rising time tTLH

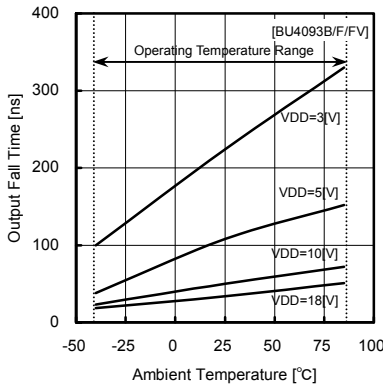


Fig. 43
 Falling time tTHL

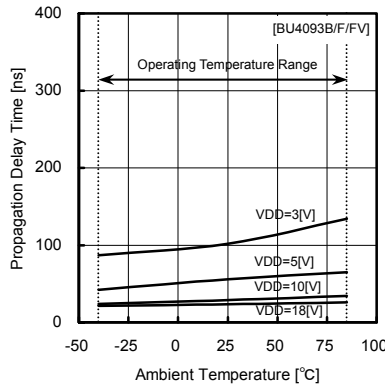


Fig. 44
 Rising propagation delay tPLH

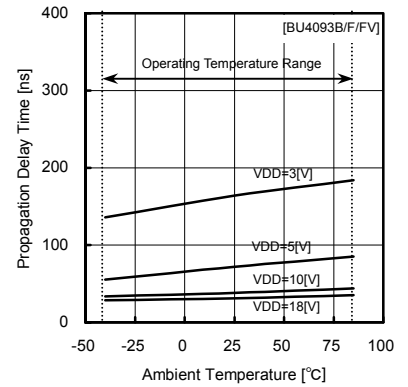


Fig. 45
 Falling propagation delay tPHL

● Electrical Characteristics Curves (BU4069UB)

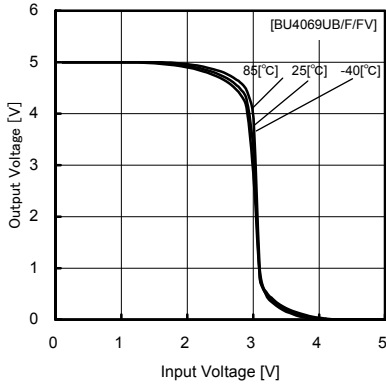


Fig. 46
 Output voltage—Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

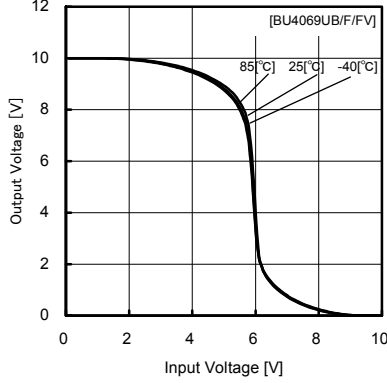


Fig. 47
 Output voltage—Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

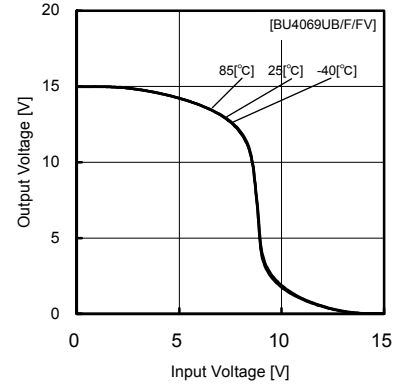


Fig. 48
 Output voltage—Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

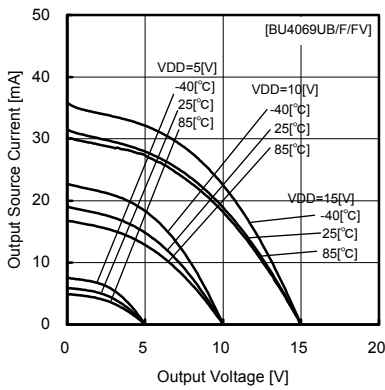


Fig. 49
 Output source current—voltage characteristics

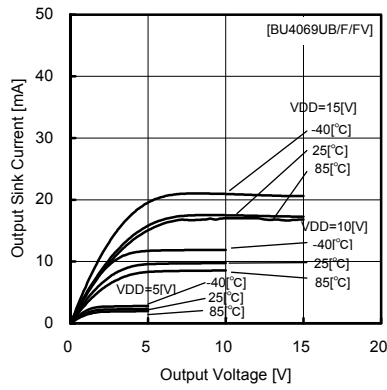


Fig. 50
 Output sink current—voltage characteristics

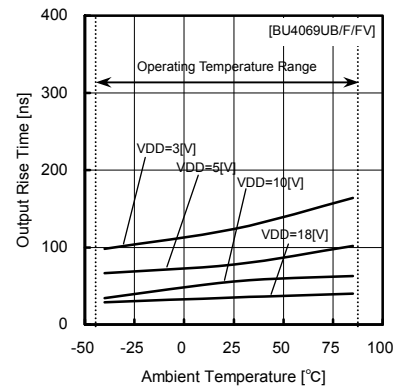


Fig. 51
 Rising time tTLH

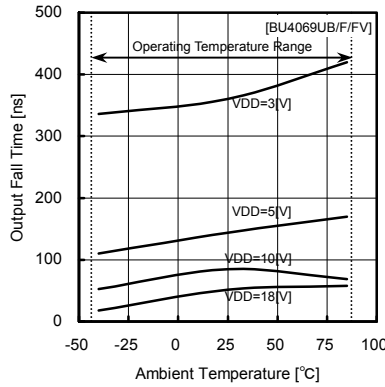


Fig. 52
 Falling time tTHL

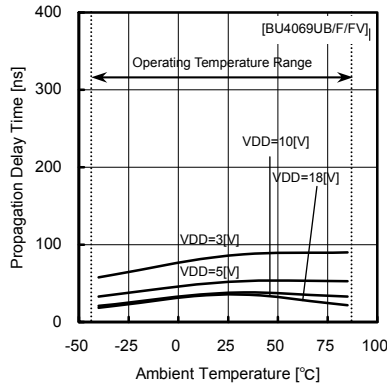


Fig. 53
 Rising propagation delay tPLH

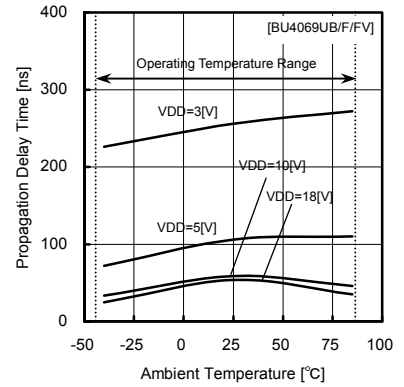


Fig. 54
 Falling propagation delay tPHL

●Electrical Characteristics Curves(BU4584B)

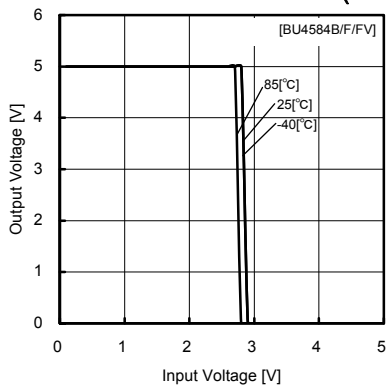


Fig.55
 Output voltage - Input voltage characteristics
 (VDD=5[V] / VSS=0[V])

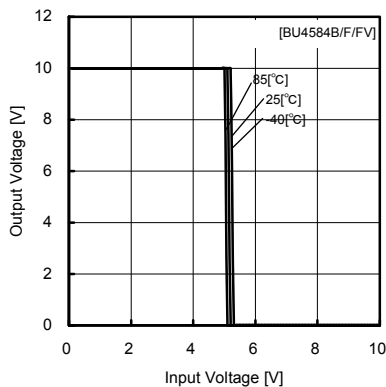


Fig.56
 Output voltage - Input voltage characteristics
 (VDD=10[V] / VSS=0[V])

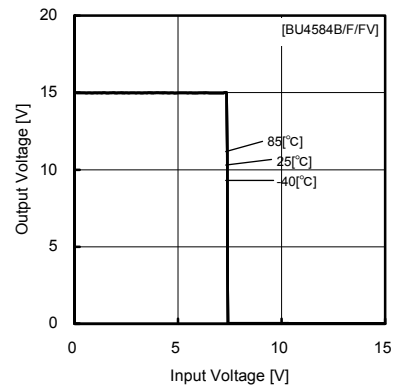


Fig.57
 Output voltage - Input voltage characteristics
 (VDD=15[V] / VSS=0[V])

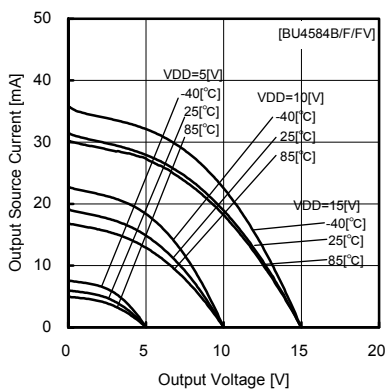


Fig.58
 Output source current - voltage characteristics

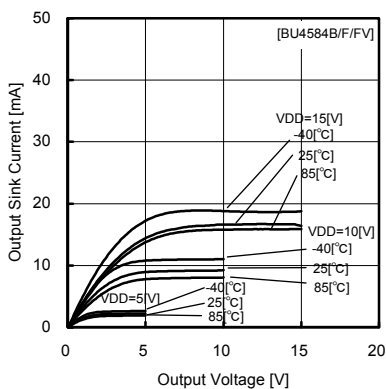


Fig.59
 Output sink current - voltage characteristics

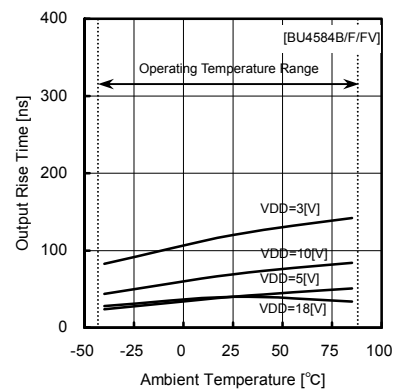


Fig.60
 Rising time tTLH

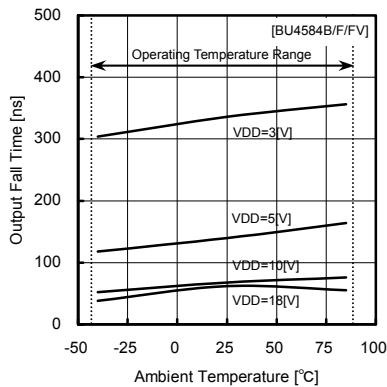


Fig.61
 Falling time tTHL

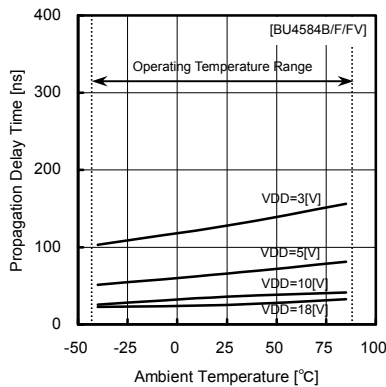


Fig.62
 Rising propagation delay tPLH

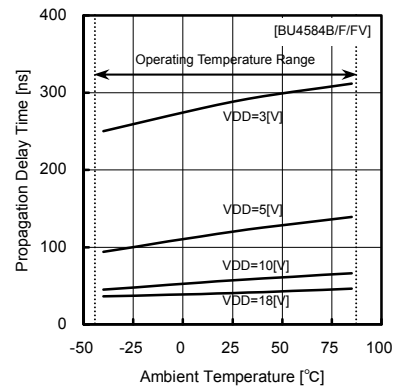
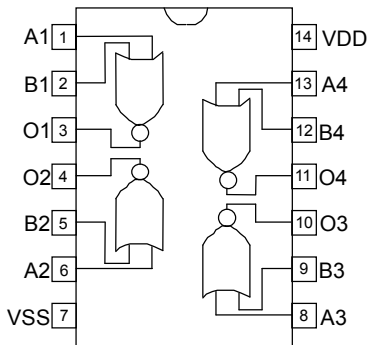


Fig.63
 Falling propagation delay tPHL

● Pinout Diagrams • Pin Description

1) BU4001B Series

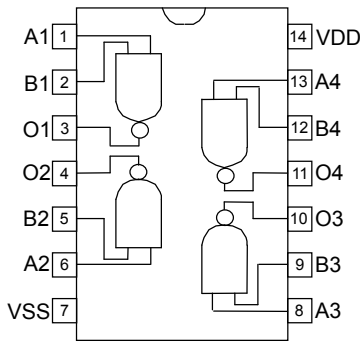


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | A1 | I | INPUT1 |
| 2 | B1 | I | INPUT1 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | B2 | I | INPUT2 |
| 6 | A2 | I | INPUT2 |
| 7 | VSS | — | Power Supply(-) |
| 8 | A3 | I | INPUT3 |
| 9 | B3 | I | INPUT3 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | B4 | I | INPUT4 |
| 13 | A4 | I | INPUT4 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | H |
| L | H | L |
| H | L | L |
| H | H | L |

2) BU4011B Series

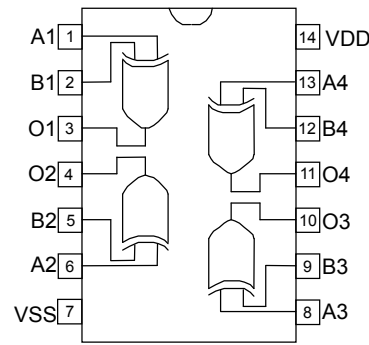


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | A1 | I | INPUT1 |
| 2 | B1 | I | INPUT1 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | B2 | I | INPUT2 |
| 6 | A2 | I | INPUT2 |
| 7 | VSS | — | Power Supply(-) |
| 8 | A3 | I | INPUT3 |
| 9 | B3 | I | INPUT3 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | B4 | I | INPUT4 |
| 13 | A4 | I | INPUT4 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

3) BU4030B Series

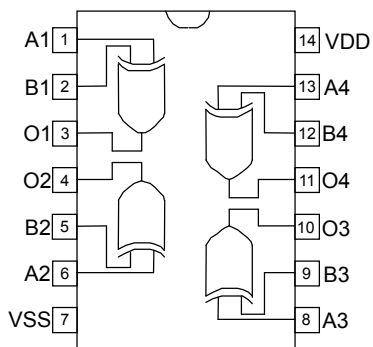


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | A1 | I | INPUT1 |
| 2 | B1 | I | INPUT1 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | B2 | I | INPUT2 |
| 6 | A2 | I | INPUT2 |
| 7 | VSS | — | Power Supply(-) |
| 8 | A3 | I | INPUT3 |
| 9 | B3 | I | INPUT3 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | B4 | I | INPUT4 |
| 13 | A4 | I | INPUT4 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

4) BU4070B Series

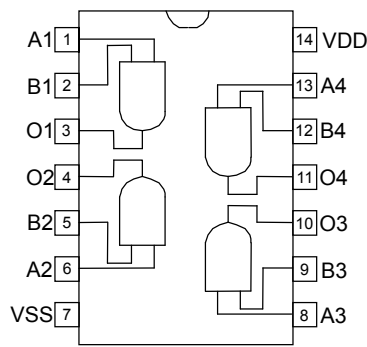


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | A1 | I | INPUT1 |
| 2 | B1 | I | INPUT1 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | B2 | I | INPUT2 |
| 6 | A2 | I | INPUT2 |
| 7 | VSS | — | Power Supply(-) |
| 8 | A3 | I | INPUT3 |
| 9 | B3 | I | INPUT3 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | B4 | I | INPUT4 |
| 13 | A4 | I | INPUT4 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | L |

5) BU4081B Series

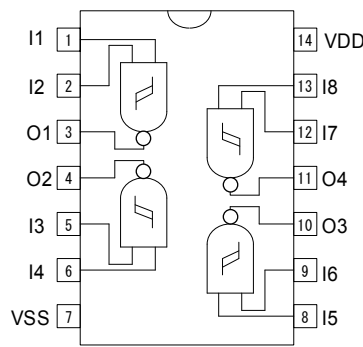


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | A1 | I | INPUT1 |
| 2 | B1 | I | INPUT1 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | B2 | I | INPUT2 |
| 6 | A2 | I | INPUT2 |
| 7 | VSS | — | Power Supply(-) |
| 8 | A3 | I | INPUT3 |
| 9 | B3 | I | INPUT3 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | B4 | I | INPUT4 |
| 13 | A4 | I | INPUT4 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

6) BU4093B Series

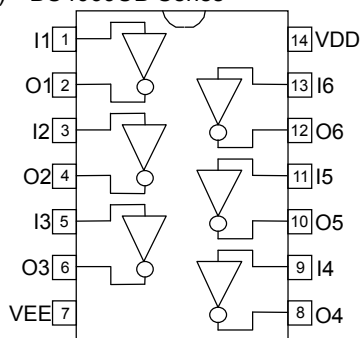


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | I1 | I | INPUT1 |
| 2 | I2 | I | INPUT2 |
| 3 | O1 | O | OUTPUT1 |
| 4 | O2 | O | OUTPUT2 |
| 5 | I3 | I | INPUT3 |
| 6 | I4 | I | INPUT4 |
| 7 | VSS | — | Power Supply(-) |
| 8 | I5 | I | INPUT5 |
| 9 | I6 | I | INPUT6 |
| 10 | O3 | O | OUTPUT3 |
| 11 | O4 | O | OUTPUT4 |
| 12 | I7 | I | INPUT7 |
| 13 | I8 | I | INPUT8 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| A | B | OUT |
|---|---|-----|
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

7) BU4069UB Series

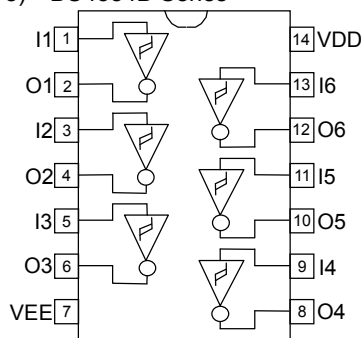


| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | I1 | I | INPUT1 |
| 2 | O1 | O | OUTPUT1 |
| 3 | I2 | I | INPUT2 |
| 4 | O2 | O | OUTPUT2 |
| 5 | I3 | I | INPUT3 |
| 6 | O3 | O | OUTPUT3 |
| 7 | VSS | — | Power Supply(-) |
| 8 | I4 | O | OUTPUT4 |
| 9 | O4 | I | INPUT4 |
| 10 | I5 | O | OUTPUT5 |
| 11 | O5 | I | INPUT5 |
| 12 | I6 | O | OUTPUT6 |
| 13 | O6 | I | INPUT6 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| IN | OUT |
|----|-----|
| H | L |
| L | H |

8) BU4584B Series



| PIN No. | PIN NAME | I/O | PIN FUNCTION |
|---------|----------|-----|-----------------|
| 1 | I1 | I | INPUT1 |
| 2 | O1 | O | OUTPUT1 |
| 3 | I2 | I | INPUT2 |
| 4 | O2 | O | OUTPUT2 |
| 5 | I3 | I | INPUT3 |
| 6 | O3 | O | OUTPUT3 |
| 7 | VSS | — | Power Supply(-) |
| 8 | I4 | O | OUTPUT4 |
| 9 | O4 | I | INPUT4 |
| 10 | I5 | O | OUTPUT5 |
| 11 | O5 | I | INPUT5 |
| 12 | I6 | O | OUTPUT6 |
| 13 | O6 | I | INPUT6 |
| 14 | VDD | — | Power Supply(+) |

TRUTH TABLE

| IN | OUT |
|----|-----|
| H | L |
| L | H |

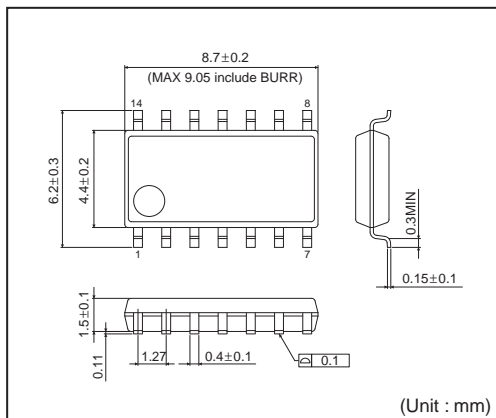
●Notes for use

- Absolute maximum ratings**
 An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.
- Connecting the power supply connector backward**
 Connecting of the power supply in reverse polarity can damage IC. Take precautions when connecting the power supply lines. An external direction diode can be added.
- Power supply lines**
 Design PCB layout pattern to provide low impedance GND and supply lines. To obtain a low noise ground and supply line, separate the ground section and supply lines of the digital and analog blocks. Furthermore, for all power supply terminals to ICs, connect a capacitor between the power supply and the GND terminal. When applying electrolytic capacitors in the circuit, not that capacitance characteristic values are reduced at low temperatures.
- GND voltage**
 The potential of GND pin must be minimum potential in all operating conditions.
- Thermal design**
 Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.
- Inter-pin shorts and mounting errors**
 Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if pins are shorted together.
- Actions in strong electromagnetic field**
 Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.
- Testing on application boards**
 When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to or removing it from a jig or fixture during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting or storing the IC.
- Ground Wiring Pattern**
 When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the ground potential of application so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.
- Unused input terminals**
 Connect all unused input terminals to VDD or VSS in order to prevent excessive current or oscillation. Insertion of a resistor (100kΩ approx.) is also recommended

● Ordering part number

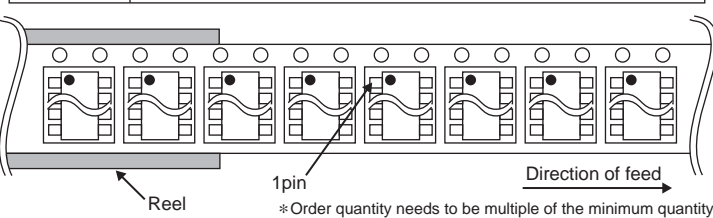
| | | | | | | | | | | | | |
|----------|---|----------|---|--------|---|---|---------------|---|---|-------------------------------------|---|--|
| B | U | 4 | 0 | 0 | 1 | B | F | V | - | E | 2 | |
| Part No. | | Part No. | | | | | Package | | | Packaging and forming specification | | |
| | | 4001B | | 4081B | | | None: DIP14 | | | E2: Embossed tape and reel | | |
| | | 4011B | | 4093B | | | F : SOP14 | | | None: Tray, Tube | | |
| | | 4030B | | 4069UB | | | FV : SSOP-B14 | | | | | |
| | | 4070B | | 4584B | | | | | | | | |

SOP14

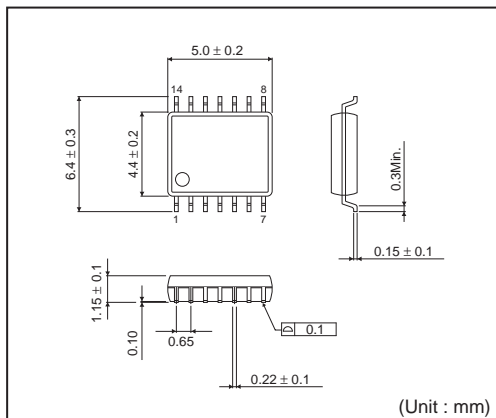


<Tape and Reel information>

| | |
|-------------------|--|
| Tape | Embossed carrier tape |
| Quantity | 2500pcs |
| Direction of feed | E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand) |

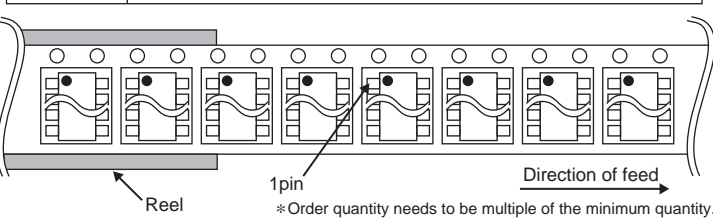


SSOP-B14

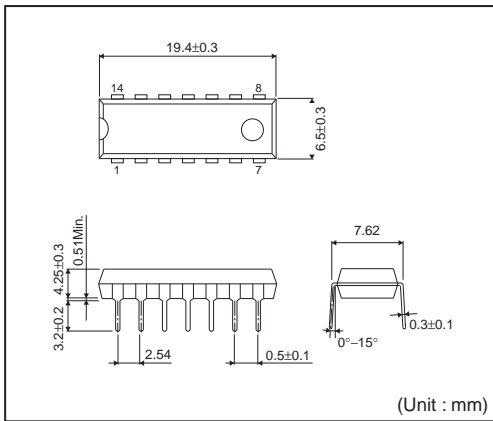


<Tape and Reel information>

| | |
|-------------------|--|
| Tape | Embossed carrier tape |
| Quantity | 2500pcs |
| Direction of feed | E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand) |

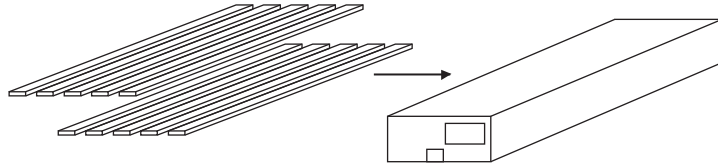


DIP14



<Tape and Reel information>

| | |
|-------------------|--|
| Container | Tube |
| Quantity | 1000pcs |
| Direction of feed | Direction of products is fixed in a container tube |



*Order quantity needs to be multiple of the minimum quantity.

Notes

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