

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

## TC4584BP, TC4584BF

### TC4584B Hex Schmitt Trigger

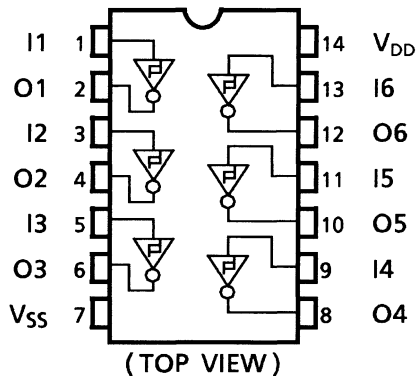
The TC4584B is the 6-circuit inverter having the Schmitt trigger function at the input terminal.

That is, since the circuit threshold level voltages at the leading and trailing edges of input waveform are different ( $V_P$ ,  $V_N$ ), the TC4584B can be used in the broad range application including line receiver, waveform shaping circuit, astable multivibrator, monostable multivibrator, etc.

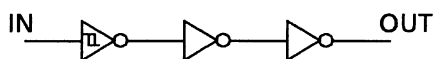
In addition to ordinary inverter.

Since the pins are compatible with the TC4069UB, the substitution is also possible.

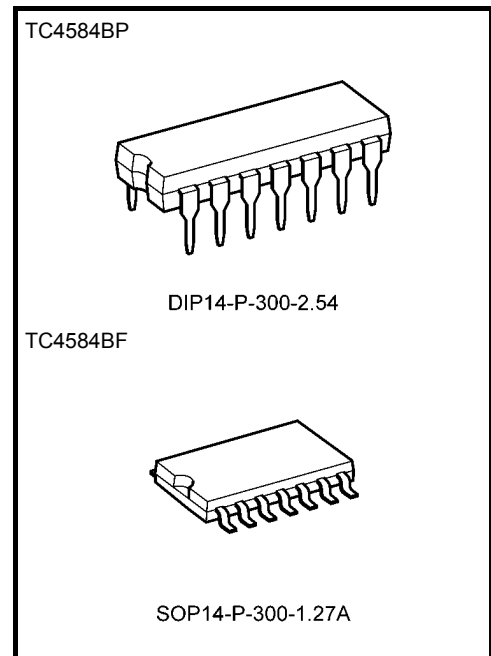
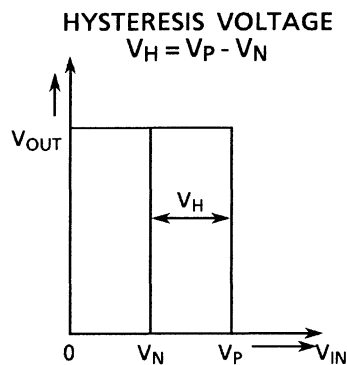
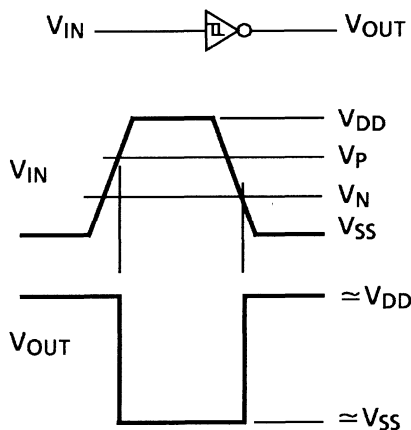
### Pin Assignment



### Logic Diagram



### Input/Output Voltage Characteristic



Weight  
DIP14-P-300-2.54 : 0.96 g (typ.)  
SOP14-P-300-1.27A : 0.18 g (typ.)

**Absolute Maximum Ratings (Note)**

| Characteristics             | Symbol    | Rating                           | Unit               |
|-----------------------------|-----------|----------------------------------|--------------------|
| DC supply voltage           | $V_{DD}$  | $V_{SS} - 0.5 \sim V_{SS} + 20$  | V                  |
| Input voltage               | $V_{IN}$  | $V_{SS} - 0.5 \sim V_{DD} + 0.5$ | V                  |
| Output voltage              | $V_{OUT}$ | $V_{SS} - 0.5 \sim V_{DD} + 0.5$ | V                  |
| DC input current            | $I_{IN}$  | $\pm 10$                         | mA                 |
| Power dissipation           | $P_D$     | 300 (DIP)/180 (SOIC)             | mW                 |
| Operating temperature range | $T_{opr}$ | $-40 \sim 85$                    | $^{\circ}\text{C}$ |
| Storage temperature range   | $T_{stg}$ | $-65 \sim 150$                   | $^{\circ}\text{C}$ |

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

**Operating Ranges ( $V_{SS} = 0\text{ V}$ ) (Note)**

| Characteristics   | Symbol   | Test Condition | Min | Typ. | Max      | Unit |
|-------------------|----------|----------------|-----|------|----------|------|
| DC supply voltage | $V_{DD}$ | —              | 3   | —    | 18       | V    |
| Input voltage     | $V_{IN}$ | —              | 0   | —    | $V_{DD}$ | V    |

Note 1: The operating ranges must be maintained to ensure the normal operation of the device.

Unused inputs must be tied to either  $V_{DD}$  or  $V_{SS}$ .

Static Electrical Characteristics ( $V_{SS} = 0\text{ V}$ )

| Characteristics                    | Sym-<br>bol | Test Condition                                                  | $V_{DD}$<br>(V)        | -40°C |       | 25°C  |       |            | 85°C  |       | Unit          |
|------------------------------------|-------------|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------------|-------|-------|---------------|
|                                    |             |                                                                 |                        | Min   | Max   | Min   | Typ.  | Max        | Min   | Max   |               |
| High-level output voltage          | $V_{OH}$    | $ I_{OUT}  < 1\text{ }\mu\text{A}$<br>$V_{IN} = V_{SS}, V_{DD}$ | 5                      | 4.95  | —     | 4.95  | 5.00  | —          | 4.95  | —     | V             |
|                                    |             |                                                                 | 10                     | 9.95  | —     | 9.95  | 10.00 | —          | 9.95  | —     |               |
|                                    |             |                                                                 | 15                     | 14.95 | —     | 14.95 | 15.00 | —          | 14.95 | —     |               |
| Low-level output voltage           | $V_{OL}$    | $ I_{OUT}  < 1\text{ }\mu\text{A}$<br>$V_{IN} = V_{SS}, V_{DD}$ | 5                      | —     | 0.05  | —     | 0.00  | 0.05       | —     | 0.05  | V             |
|                                    |             |                                                                 | 10                     | —     | 0.05  | —     | 0.00  | 0.05       | —     | 0.05  |               |
|                                    |             |                                                                 | 15                     | —     | 0.05  | —     | 0.00  | 0.05       | —     | 0.05  |               |
| Output high current                | $I_{OH}$    | $V_{OH} = 4.6\text{ V}$                                         | 5                      | -0.61 | —     | -0.51 | -1.0  | —          | -0.42 | —     | mA            |
|                                    |             | $V_{OH} = 2.5\text{ V}$                                         | 5                      | -2.50 | —     | -2.10 | -4.0  | —          | -1.70 | —     |               |
|                                    |             | $V_{OH} = 9.5\text{ V}$                                         | 10                     | -1.50 | —     | -1.30 | -2.2  | —          | -1.10 | —     |               |
|                                    |             | $V_{OH} = 13.5\text{ V}$                                        | 15                     | -4.00 | —     | -3.40 | -9.0  | —          | -2.80 | —     |               |
|                                    |             | $V_{IN} = V_{SS}$                                               |                        |       |       |       |       |            |       |       |               |
| Output low current                 | $I_{OL}$    | $V_{OL} = 0.4\text{ V}$                                         | 5                      | 0.61  | —     | 0.51  | 1.5   | —          | 0.42  | —     | mA            |
|                                    |             | $V_{OL} = 0.5\text{ V}$                                         | 10                     | 1.50  | —     | 1.30  | 3.8   | —          | 1.10  | —     |               |
|                                    |             | $V_{OL} = 1.5\text{ V}$                                         | 15                     | 4.00  | —     | 3.40  | 15.0  | —          | 2.80  | —     |               |
|                                    |             | $V_{IN} = V_{DD}$                                               |                        |       |       |       |       |            |       |       |               |
| Positive trigger threshold voltage | $V_P$       | $V_{OUT} = 0.5\text{ V}$                                        | 5                      | 2.05  | 3.75  | 2.15  | 3.0   | 3.75       | 2.15  | 3.85  | V             |
|                                    |             | $V_{OUT} = 1.0\text{ V}$                                        | 10                     | 4.80  | 7.60  | 4.90  | 6.4   | 7.60       | 4.90  | 7.70  |               |
|                                    |             | $V_{OUT} = 1.5\text{ V}$                                        | 15                     | 7.80  | 11.60 | 7.90  | 9.9   | 11.60      | 7.90  | 11.70 |               |
| Negative trigger threshold voltage | $V_N$       | $V_{OUT} = 4.5\text{ V}$                                        | 5                      | 1.25  | 2.95  | 1.25  | 2.3   | 2.85       | 1.15  | 2.85  | V             |
|                                    |             | $V_{OUT} = 9.0\text{ V}$                                        | 10                     | 2.40  | 5.20  | 2.40  | 3.8   | 5.10       | 2.30  | 5.10  |               |
|                                    |             | $V_{OUT} = 13.5\text{ V}$                                       | 15                     | 3.40  | 7.20  | 3.40  | 5.2   | 7.10       | 3.30  | 7.10  |               |
| Hysteresis voltage                 | $V_H$       | —                                                               | 5                      | 0.10  | 1.25  | 0.25  | 0.65  | 1.25       | 0.25  | 1.40  | V             |
|                                    |             |                                                                 | 10                     | 1.80  | 3.50  | 1.90  | 2.60  | 3.50       | 1.90  | 3.60  |               |
|                                    |             |                                                                 | 15                     | 3.70  | 5.60  | 3.80  | 4.70  | 5.60       | 3.80  | 5.70  |               |
| Input current                      | "H" level   | $I_{IH}$                                                        | $V_{IH} = 18\text{ V}$ | 18    | —     | 0.1   | —     | $10^{-5}$  | 0.1   | —     | $\mu\text{A}$ |
|                                    | "L" level   | $I_{IL}$                                                        | $V_{IL} = 0\text{ V}$  | 18    | —     | -0.1  | —     | $-10^{-5}$ | -0.1  | —     |               |
| Quiescent supply current           | $I_{DD}$    | $V_{IN} = V_{SS}, V_{DD}$<br>(Note)                             | 5                      | —     | 1     | —     | 0.001 | 1          | —     | 7.5   | $\mu\text{A}$ |
|                                    |             |                                                                 | 10                     | —     | 2     | —     | 0.002 | 2          | —     | 15.0  |               |
|                                    |             |                                                                 | 15                     | —     | 4     | —     | 0.004 | 4          | —     | 30.0  |               |

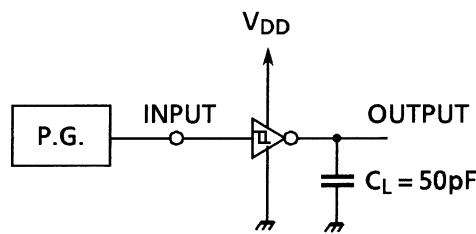
Note: All valid input combinations.

Dynamic Electrical Characteristics (Ta = 25°C, VSS = 0 V, CL = 50 pF)

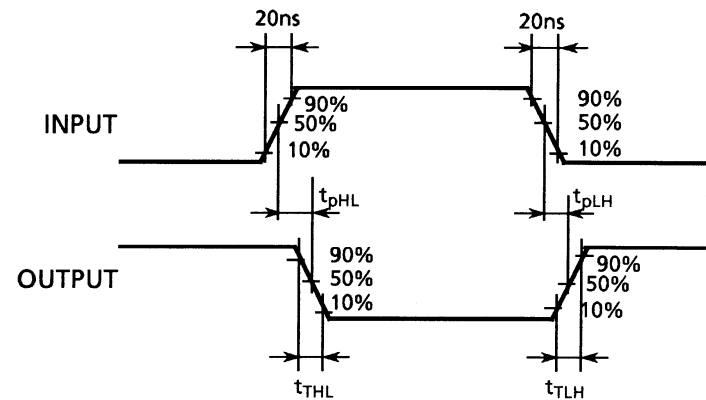
| Characteristics                         | Symbol       | Test Condition |         | Min | Typ. | Max | Unit |
|-----------------------------------------|--------------|----------------|---------|-----|------|-----|------|
|                                         |              |                | VDD (V) |     |      |     |      |
| Output transition time<br>(low to high) | tTLH         | —              | 5       | —   | 80   | 200 | ns   |
|                                         |              |                | 10      | —   | 50   | 100 |      |
|                                         |              |                | 15      | —   | 40   | 80  |      |
| Output transition time<br>(high to low) | tTHL         | —              | 5       | —   | 80   | 200 | ns   |
|                                         |              |                | 10      | —   | 50   | 100 |      |
|                                         |              |                | 15      | —   | 40   | 80  |      |
| Propagation delay time                  | tpLH<br>tpHL | —              | 5       | —   | 170  | 340 | ns   |
|                                         |              |                | 10      | —   | 80   | 160 |      |
|                                         |              |                | 15      | —   | 60   | 120 |      |
| Input capacitance                       | CIN          | —              |         | —   | 5    | 7.5 | pF   |

Circuit and Waveform for Measurement of Dynamic Characteristics

Circuit



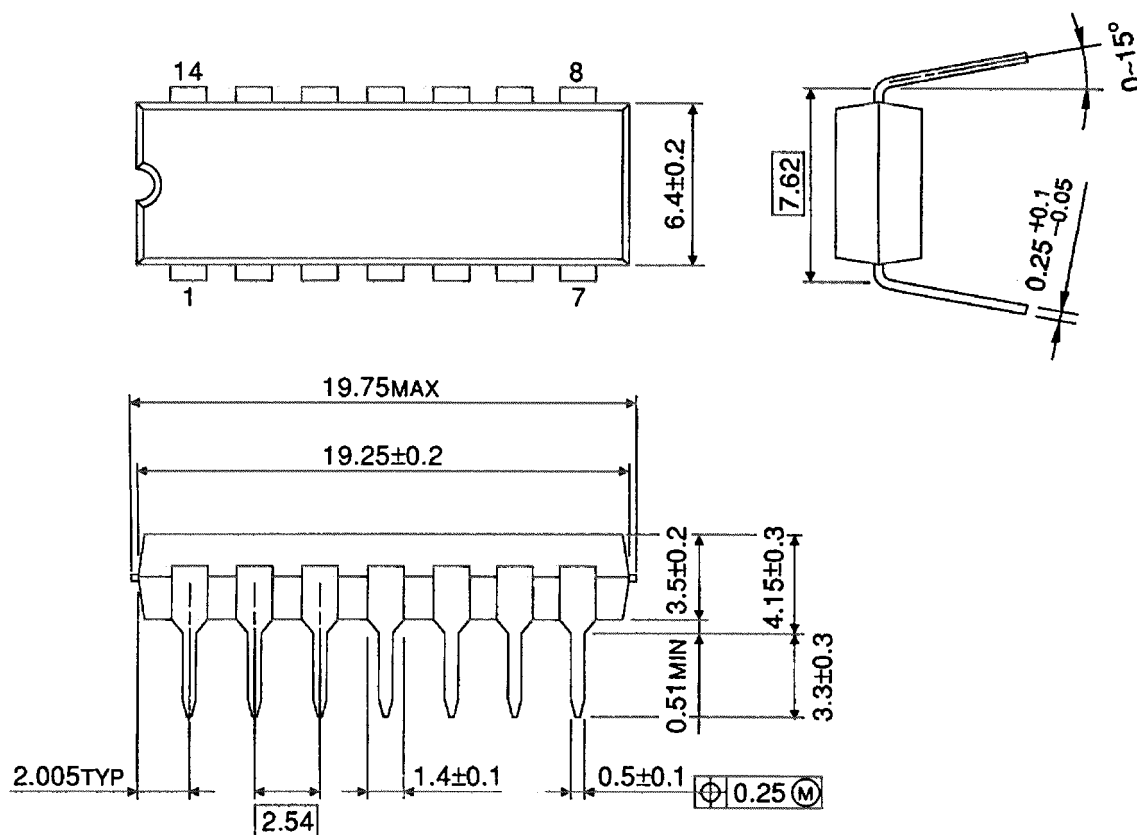
Waveform



## Package Dimensions

DIP14-P-300-2.54

Unit : mm

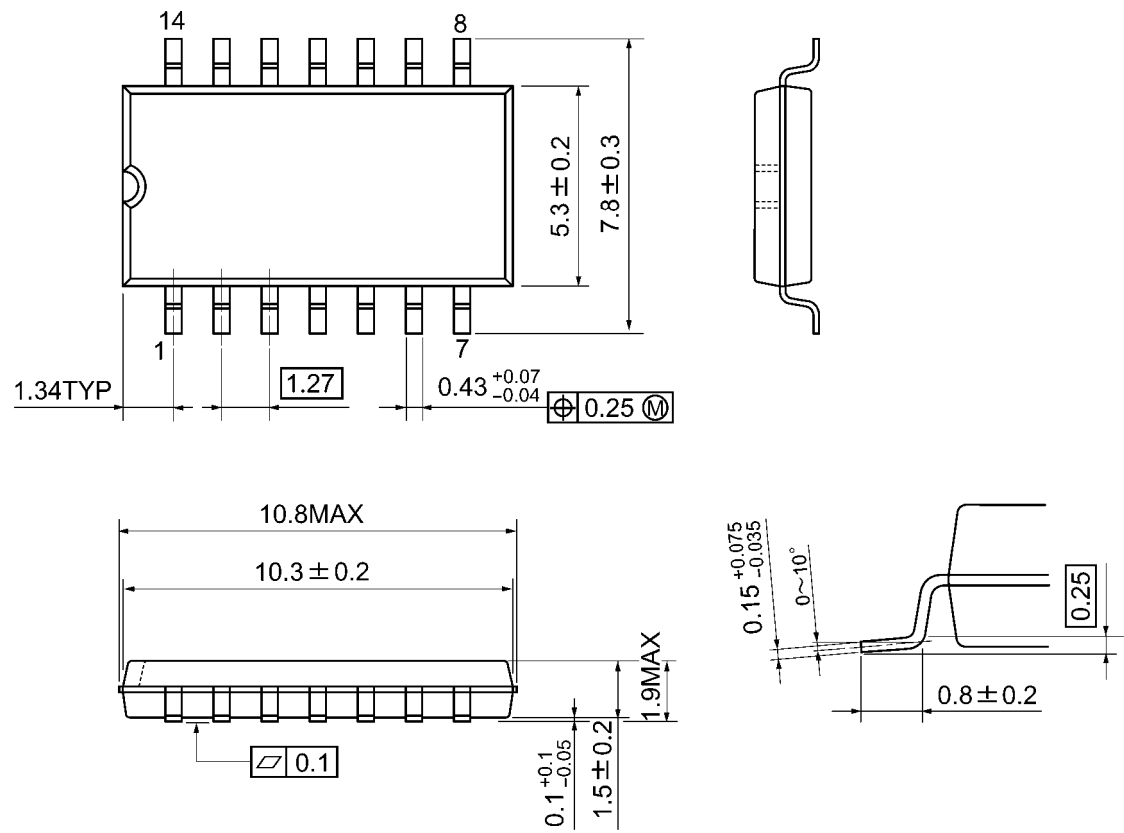


Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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