

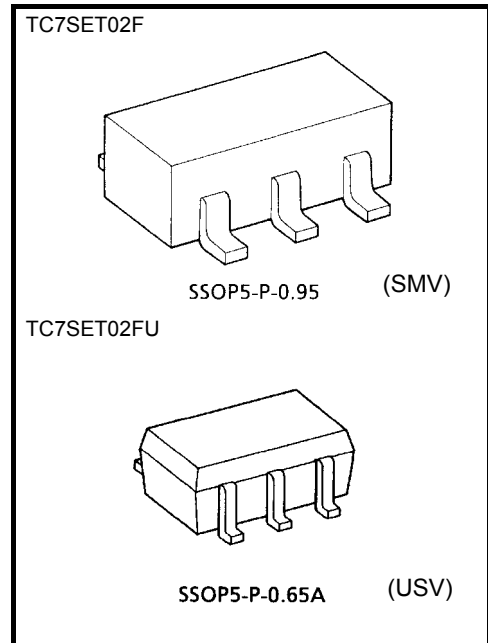
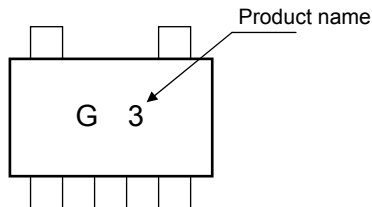
TC7SET02F, TC7SET02FU

2 Input NOR Gate

Features

- High speed : $t_{pd} = 4.2 \text{ ns (typ.)}$
at $V_{CC} = 5 \text{ V}$, $C_L = 15\text{pF}$
- Low power dissipation : $I_{CC} = 2 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs : $V_{IL} = 0.8 \text{ V (max)}$
 $V_{IH} = 2.0 \text{ V (min)}$
- 5.5-V tolerant inputs
- Balanced Propagation Delays : $t_{pLH} \doteq t_{pHL}$

Marking

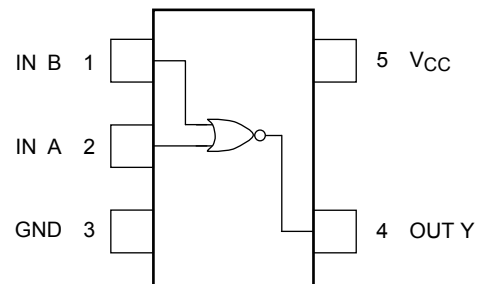


Weight
 SSOP5-P-0.95 : 0.016 g (typ.)
 SSOP5-P-0.65A : 0.006 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|-----------|------------------------|------|
| Supply voltage | V_{CC} | -0.5 to 7.0 | V |
| DC input voltage | V_{IN} | -0.5 to 7.0 | V |
| DC output voltage | V_{OUT} | -0.5 to $V_{CC} + 0.5$ | V |
| Input diode current | I_{IK} | -20 | mA |
| Output diode current | I_{OK} | ± 20 (Note 1) | mA |
| DC output current | I_{OUT} | ± 25 | mA |
| DC V_{CC} /ground current | I_{CC} | ± 50 | mA |
| Power dissipation | P_D | 200 | mW |
| Storage temperature | T_{stg} | -65 to 150 | °C |
| Lead temperature (10s) | T_L | 260 | °C |

Pin Assignment (top view)



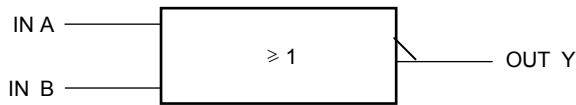
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

Note1: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

Start of commercial production
 1996-09

IEC Logic Symbol



Truth Table

| A | B | Y |
|---|---|---|
| L | L | H |
| L | H | L |
| H | L | L |
| H | H | L |

Operating Ranges

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-----------|-------------|------|
| Supply voltage | V_{CC} | 4.5 to 5.5 | V |
| Input voltage | V_{IN} | 0 to 5.5 | V |
| Output voltage | V_{OUT} | 0~ V_{CC} | V |
| Operating temperature | T_{opr} | -40 to 85 | °C |
| Input rise and fall time | dt/dv | 0 to 20 | ns/V |

Electrical Characteristics DC Characteristics

| Characteristics | Symbol | Test Condition | $T_a = 25^\circ\text{C}$ | | | $T_a = -40 \text{ to } 85^\circ\text{C}$ | | Unit | | |
|---------------------------|-----------|--|----------------------------|-----|------|--|------|-----------|---------------|---|
| | | | V_{CC} (V) | Min | Typ. | Max | Min | | Max | |
| High-level input voltage | V_{IH} | — | 4.5 to 5.5 | 2.0 | — | — | 2.0 | — | V | |
| Low-level input voltage | V_{IL} | — | 4.5 to 5.5 | — | — | 0.8 | — | 0.8 | V | |
| High-level output voltage | V_{OH} | $V_{IN} = V_{IL}$ | $I_{OH} = -50 \mu\text{A}$ | 4.5 | 4.4 | 4.5 | — | 4.4 | — | V |
| | | | $I_{OH} = -8 \text{ mA}$ | 4.5 | 3.94 | — | — | 3.80 | — | |
| Low-level output voltage | V_{OL} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 50 \mu\text{A}$ | 4.5 | — | 0.0 | 0.10 | — | 0.10 | V |
| | | | $I_{OL} = 8 \text{ mA}$ | 4.5 | — | — | 0.36 | — | 0.44 | |
| Input leakage current | I_{IN} | $V_{IN} = 5.5 \text{ V}$ or GND | 0 to 5.5 | — | — | ± 0.1 | — | ± 1.0 | μA | |
| Quiescent supply current | I_{CC} | $V_{IN} = V_{CC}$ or GND | 5.5 | — | — | 2.0 | — | 20.0 | μA | |
| | I_{CCT} | Per Input : $V_{IN} = 3.4 \text{ V}$ Other Input: V_{CC} or GND | 5.5 | — | — | 1.35 | — | 1.50 | mA | |

AC Characteristics (input: $t_r = t_f = 3 \text{ ns}$)

| Characteristics | Symbol | Test Condition | | $T_a = 25^\circ\text{C}$ | | | $T_a = -40 \text{ to } 85^\circ\text{C}$ | | Unit |
|-------------------------------|------------------------|----------------|------------|--------------------------|------|-----|--|------|------|
| | | V_{CC} (V) | C_L (pF) | Min | Typ. | Max | Min | Max | |
| Propagation delay time | t_{pLH} t_{pHL} | 5.0 ± 0.5 | 15 | — | 4.2 | 6.2 | 1.0 | 7.1 | ns |
| | | | 50 | — | 6.5 | 9.0 | 1.0 | 10.3 | |
| Input capacitance | C_{IN} | — | — | — | 4 | 10 | — | 10 | pF |
| Power dissipation capacitance | C_{PD} | — | (Note 2) | — | 17 | — | — | — | pF |

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

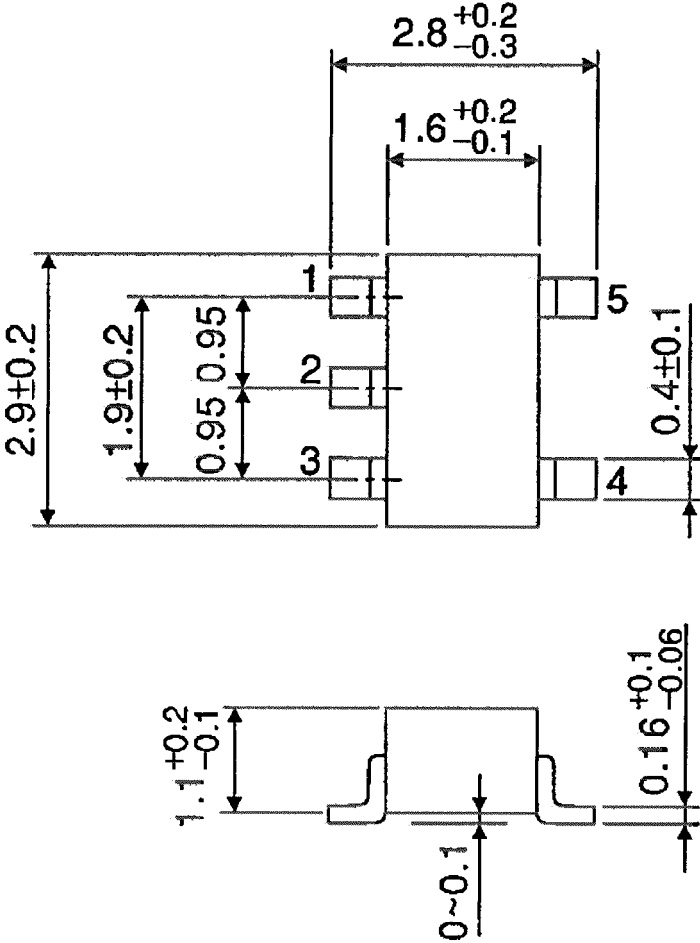
Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Package Dimensions

SSOP5-P-0.95

Unit : mm

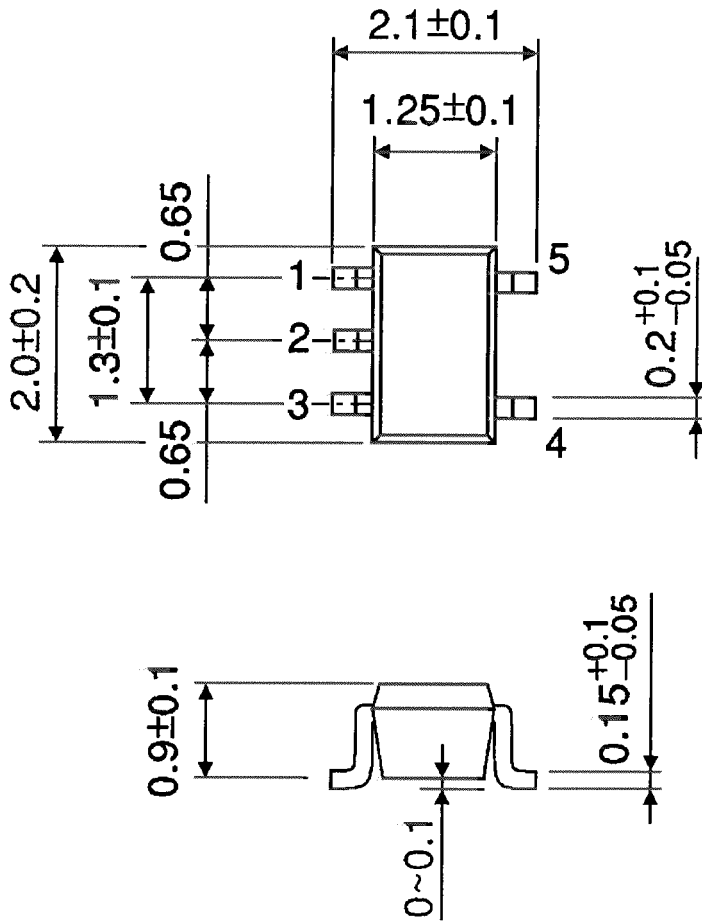


Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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