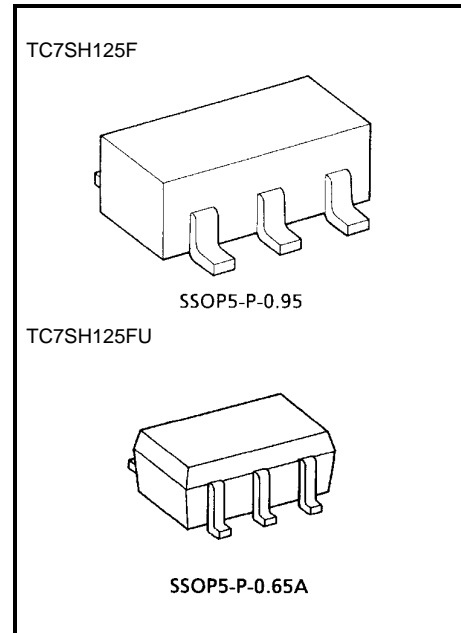


TC7SH125F, TC7SH125FU

Bus Buffer

Features

- High speed: $t_{pd} = 3.8 \text{ ns (typ.)}$ at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 2 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- 5.5V tolerant input.
- Wide operating voltage range: $V_{CC} \text{ (opr)} = 2\text{--}5.5 \text{ V}$

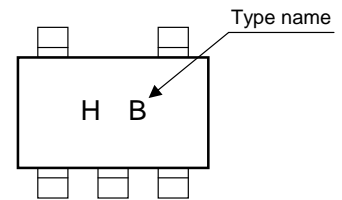


Weight
 SSOP5-P-0.95 : 0.016 g (typ.)
 SSOP5-P-0.65A : 0.006 g (typ.)

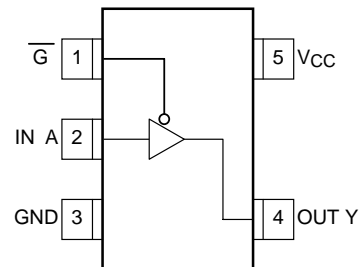
Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|-----------|----------------------|------|
| Supply voltage range | V_{CC} | -0.5~7.0 | V |
| DC input voltage | V_{IN} | -0.5~7.0 | V |
| DC output voltage | V_{OUT} | -0.5~ $V_{CC} + 0.5$ | V |
| Input diode current | I_{IK} | -20 | mA |
| Output diode current | I_{OK} | ±20 | 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} | -65~150 | °C |
| Lead temperature (10 s) | T_L | 260 | °C |

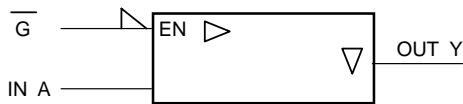
Marking



Pin Assignment (top view)



Logic Diagram



Truth Table

| \overline{G} | A | Y |
|----------------|---|---|
| H | X | Z |
| L | L | L |
| L | H | H |

Recommended Operating Conditions

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-----------|--------------------------------------|------|
| Supply voltage | V_{CC} | 2~5.5 | V |
| Input voltage | V_{IN} | 0~5.5 | V |
| | | 0~ V_{CC} | |
| Operating temperature | T_{opr} | -40~85 | °C |
| Input rise and fall time | dt/dv | 0~100 ($V_{CC} = 3.3 V \pm 0.3 V$) | ns/V |
| | | 0~20 ($V_{CC} = 5 V \pm 0.5 V$) | |

DC Electrical Characteristics

| Characteristics | Symbol | Test Circuit | Test Condition | $T_a = 25^\circ\text{C}$ | | | $T_a = -40\sim 85^\circ\text{C}$ | | Unit | | |
|---------------------------|----------|--------------|----------------------------------|----------------------------|---------------------|------|----------------------------------|---------------------|---------------------|---------------|---|
| | | | | V_{CC} (V) | Min | Typ. | Max | Min | | Max | |
| High-level input voltage | V_{IH} | — | — | 2.0 | 1.5 | — | — | 1.5 | — | V | |
| | | | | 3.0~5.5 | $V_{CC} \times 0.7$ | — | — | $V_{CC} \times 0.7$ | — | | |
| Low-level input voltage | V_{IL} | — | — | 2.0 | — | — | 0.5 | — | 0.5 | V | |
| | | | | 3.0~5.5 | — | — | $V_{CC} \times 0.3$ | — | $V_{CC} \times 0.3$ | | |
| High-level output voltage | V_{OH} | — | $V_{IN} = V_{IH}$ | $I_{OH} = -50 \mu\text{A}$ | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V |
| | | | | | 3.0 | 2.9 | 3.0 | — | 2.9 | — | |
| | | | | $I_{OH} = -4 \text{ mA}$ | 3.0 | 2.58 | — | — | 2.48 | — | |
| | | | | | 4.5 | 3.94 | — | — | 3.80 | — | |
| Low-level output voltage | V_{OL} | — | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 50 \mu\text{A}$ | 2.0 | — | 0 | 0.1 | — | 0.1 | V |
| | | | | | 3.0 | — | 0 | 0.1 | — | 0.1 | |
| | | | | $I_{OL} = 4 \text{ mA}$ | 4.5 | — | 0 | 0.1 | — | 0.1 | |
| | | | | | 3.0 | — | — | 0.36 | — | 0.44 | |
| $I_{OL} = 8 \text{ mA}$ | 4.5 | — | — | 0.36 | — | 0.44 | | | | | |
| | 3.0 | — | — | 0.36 | — | 0.44 | | | | | |
| Input leakage current | I_{IN} | — | $V_{IN} = 5.5 \text{ V or GND}$ | 0~5.5 | — | — | ± 0.1 | — | ± 1.0 | μA | |
| Quiescent supply current | I_{CC} | — | $V_{IN} = V_{CC} \text{ or GND}$ | 5.5 | — | — | 2.0 | — | 20.0 | μA | |

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

| Characteristics | Symbol | Test Circuit | Test Condition | | Ta = 25°C | | | Ta = -40~85°C | | Unit | |
|-------------------------------|------------------|--------------|---------------------|---------------------|-----------|------|-----|---------------|-----|------|----|
| | | | V _{CC} (V) | C _L (pF) | Min | Typ. | Max | Min | Max | | |
| Propagation delay time | t _{pLH} | — | — | 3.3 ± 0.3 | 15 | — | 5.6 | 8.0 | 1.0 | 9.5 | ns |
| | | | | | 50 | — | 8.1 | 11.5 | 1.0 | 13.0 | |
| | 5.0 ± 0.5 | | | 15 | — | 3.8 | 5.5 | 1.0 | 6.5 | | |
| | | | | 50 | — | 5.3 | 7.5 | 1.0 | 8.5 | | |
| 3-state output enable time | t _{pZL} | — | — | 3.3 ± 0.3 | 15 | — | 5.4 | 8.0 | 1.0 | 9.5 | ns |
| | | | | | 50 | — | 7.9 | 11.5 | 1.0 | 13.0 | |
| | 5.0 ± 0.5 | | | 15 | — | 3.6 | 5.1 | 1.0 | 6.0 | | |
| | | | | 50 | — | 5.1 | 7.1 | 1.0 | 8.0 | | |
| 3-state output disable time | t _{pLZ} | — | — | 3.3 ± 0.3 | 50 | — | 9.5 | 13.2 | 1.0 | 15.0 | ns |
| | t _{pHZ} | | | 5.0 ± 0.5 | 50 | — | 6.1 | 8.8 | 1.0 | 10.0 | |
| Input capacitance | C _{IN} | — | — | | — | 4 | 10 | — | 10 | pF | |
| Output capacitance | C _{OUT} | — | — | | — | 6 | — | — | — | pF | |
| Power dissipation capacitance | C _{PD} | — | (Note) | | — | 14 | — | — | — | pF | |

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

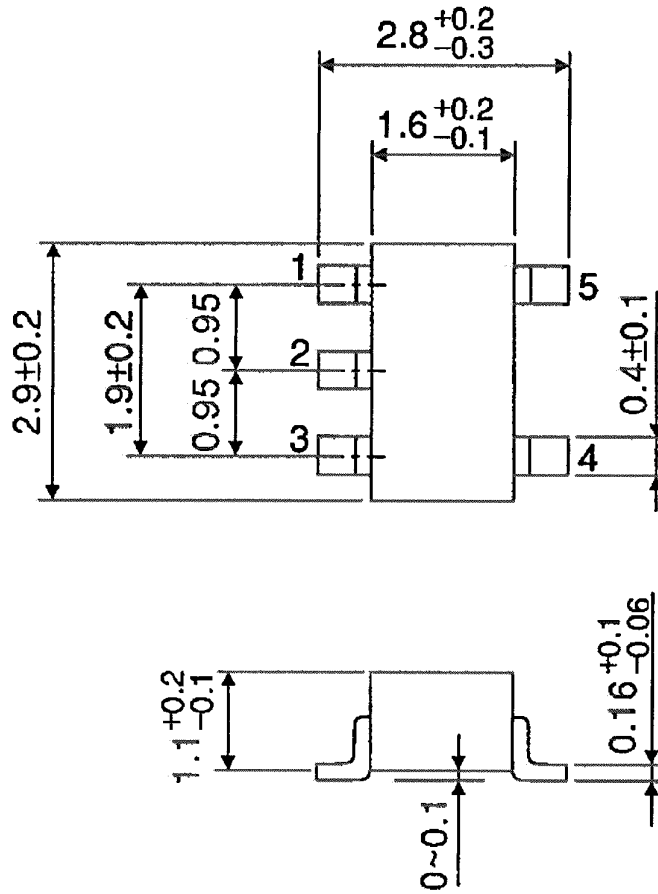
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP5-P-0.95

Unit : mm

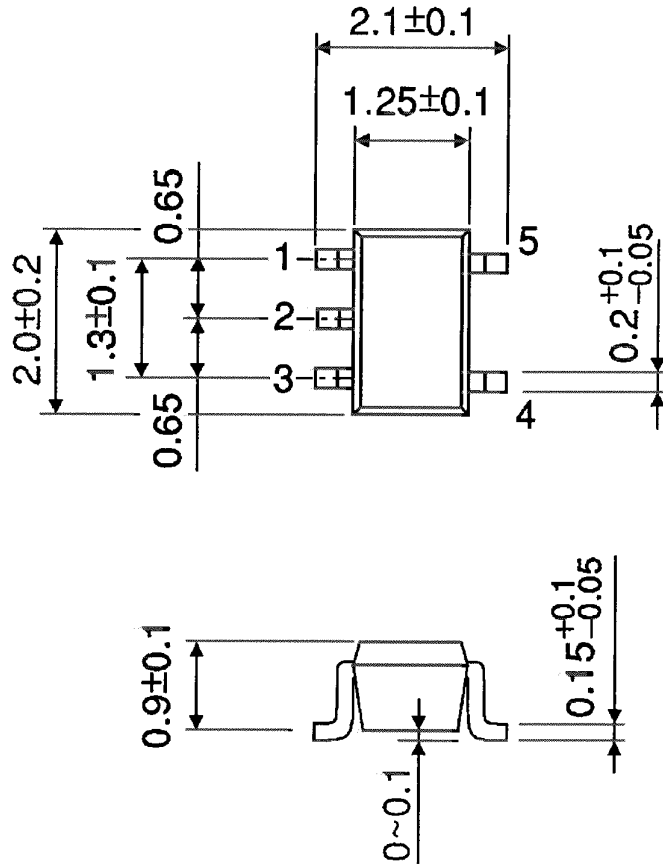


Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.