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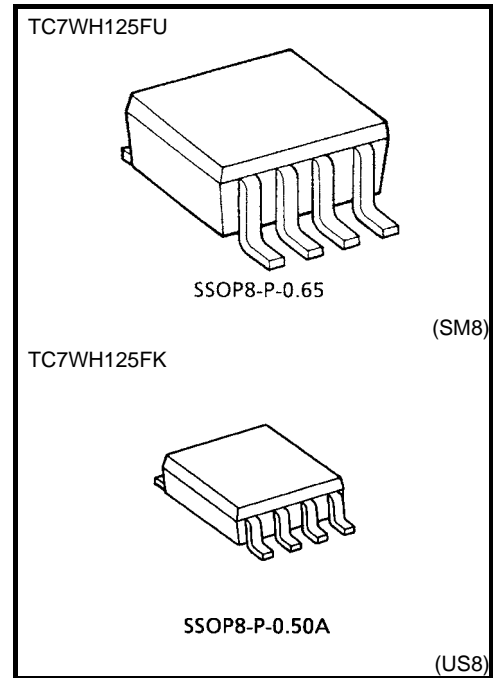
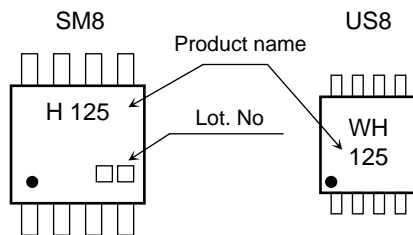
TC7WH125FU, TC7WH125FK

Dual Bus Buffer with 3-STATE Output

Features

- High speed $t_{pd} = 3.8 \text{ ns (typ.)}$ at $V_{CC} = 5.0 \text{ V}$, $C_L = 15\text{pF}$
- 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.)
 - 5.5-V tolerant inputs
 - Wide operating voltage range: $V_{CC} = 2.0$ to 5.5 V
 - Low Noise : $V_{OLP} = 0.8\text{V(max.)}$

Marking

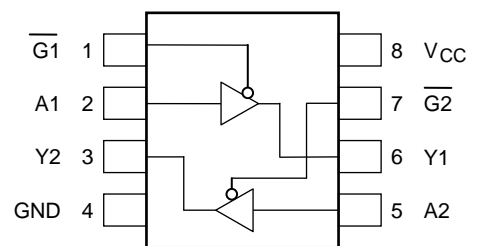


Weight
 SSOP8-P-0.65 : 0.02 g (typ.)
 SSOP8-P-0.50A : 0.01 g (typ.)

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} / GND current | I_{CC} | ± 50 | mA |
| Power dissipation | P_D | 300 (SM8) 200 (US8) | 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).

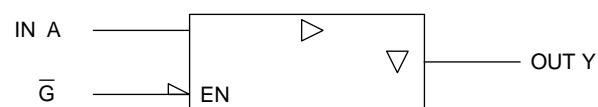
Note 1: $V_{OUT} < GND, V_{OUT} > V_{CC}$

Truth Table

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

X: Don't Care
Z: High impedance

IEC Logic Symbol



Operating Ranges

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-----------|-----------------------------------|------|
| Supply voltage | V_{CC} | 2.0 to 5.5 | V |
| Input voltage | V_{IN} | 0 to 5.5 | V |
| Output voltage | V_{OUT} | 0 to V_{CC} | V |
| Operating temperature | T_{opr} | -40 to 85 | °C |
| Input rise and fall time | dt/dv | 0 to 100 ($V_{CC}=3.3\pm 0.3V$) | ns/V |
| | | 0 to 20 ($V_{CC}=5.0\pm 0.5V$) | |

Electrical Characteristics

DC Characteristics

| Characteristics | | Symbol | Test Condition | | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | |
|----------------------------------|------------|-----------------|---|--------------------------|---------------------|-----------------------|------|-----------------------|-----------------------|-----------------------|-----|
| | | | | | V _{CC} (V) | Min | Typ. | Max | Min | | Max |
| Input voltage | High level | V _{IH} | — | | 2.0 | 1.5 | — | — | 1.5 | — | V |
| | | | | | 3.0 to 5.5 | V _{CC} × 0.7 | — | — | V _{CC} × 0.7 | — | |
| | Low level | V _{IL} | — | | 2.0 | — | — | 0.5 | — | 0.5 | |
| | | | | | 3.0 to 5.5 | — | — | V _{CC} × 0.3 | — | V _{CC} × 0.3 | |
| Output voltage | High level | V _{OH} | V _{IN} = V _{IL} or V _{IH} | I _{OH} = -50 μA | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V |
| | | | | | 3.0 | 2.9 | 3.0 | — | 2.9 | — | |
| | | | | I _{OH} = -4 mA | 4.5 | 4.4 | 4.5 | — | 4.4 | — | |
| | | | | | 3.0 | 2.58 | — | — | 2.48 | — | |
| | Low level | V _{OL} | V _{IN} = V _{IL} | I _{OL} = 50 μA | 2.0 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | | | 3.0 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | | I _{OH} = -4 mA | 4.5 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | | | 3.0 | — | — | 0.36 | — | 0.44 | |
| | | | | I _{OH} = -8 mA | 4.5 | — | — | 0.36 | — | 0.44 | |
| | | | | | 3.0 | — | — | 0.36 | — | 0.44 | |
| 3-state output off-state current | | I _{OZ} | V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} to GND | | 5.5 | — | — | ±0.25 | — | ±2.5 | μA |
| Input leakage current | | I _{IN} | V _{IN} = 5.5V 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 |

AC Characteristics (unless otherwise specified, Input: $t_r = t_f = 3$ ns)

| Characteristics | Symbol | Test Condition | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | | |
|-------------------------------|-------------------|-----------------------|---------------------|--------|-----|------------------|------|------|------|-----|
| | | | V _{CC} (V) | CL(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 | |
| | t _{pHL} | | 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} | R _L = 1 kΩ | 3.3±0.3 | 15 | — | 5.4 | 8.0 | 1.0 | 9.5 | ns |
| | | | | 50 | — | 7.9 | 11.5 | 1.0 | 13.0 | |
| | t _{pZH} | | 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} | R _L = 1 kΩ | 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 | |
| Output to Output Skew | t _{osLH} | (Note 2) | 3.3±0.3 | 50 | — | — | 1.5 | — | 1.5 | ns |
| | t _{osHL} | | 5.0±0.5 | 50 | — | — | 1.0 | — | 1.0 | |
| Input capacitance | C _{IN} | | | | — | 4 | 10 | — | 10 | pF |
| Output capacitance | C _{OUT} | | | | — | 6 | — | — | — | pF |
| Power dissipation capacitance | C _{PD} | | (Note3) | | — | 14 | — | — | — | pF |

Note 2: Parameter guaranteed by design. $t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$

Note 3: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

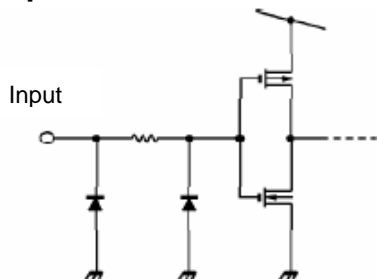
Average operating current can be obtained by the equation:

$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$$

Noise Characteristics (Ta=25°C, Input tr= tf = 3n)

| Characteristics | Symbol | Test Condition | V _{CC} (V) | Typ. | Limit | Unit |
|--|------------------|-----------------------|---------------------|------|-------|------|
| | | | | | | |
| Quiet Output Minimum Dynamic V _{OL} | V _{OLV} | C _L = 50pF | 5.0 | -0.3 | -0.8 | V |
| Minimum High Level Dynamic Input Voltage | V _{IHD} | C _L = 50pF | 5.0 | — | 3.5 | V |
| Maximum Low Level Dynamic Input Voltage | V _{ILD} | C _L = 50pF | 5.0 | — | 1.5 | V |

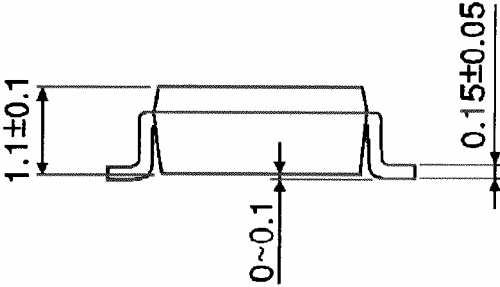
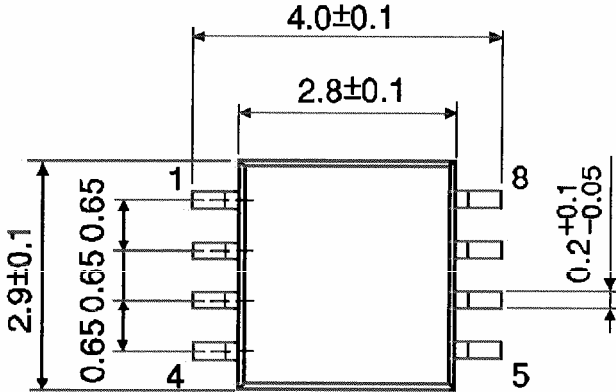
Input Equivalent Circuit



Package Dimensions

SSOP8-P-0.65

Unit : mm

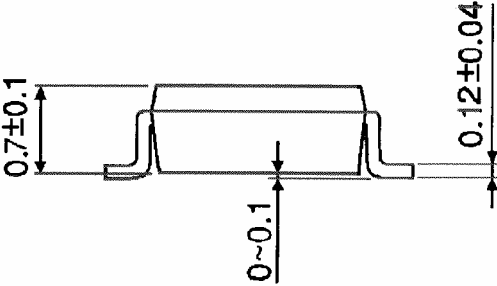
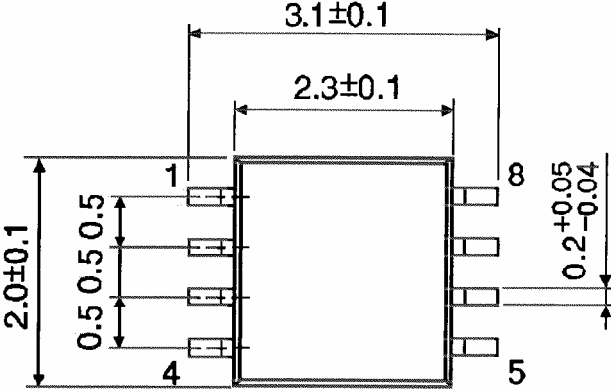


Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)

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