

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

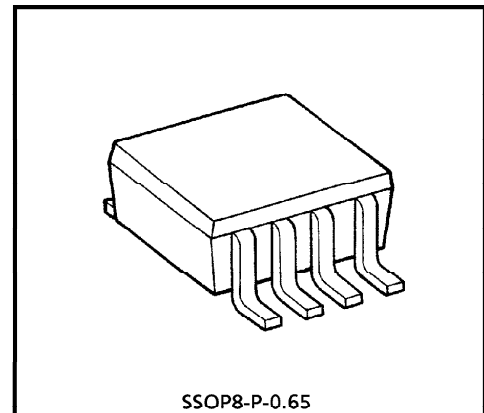
# TC7W125FU

## DUAL BUS BUFFER

The TC7W125FU is a high speed C<sup>2</sup>MOS DUAL BUS BUFFERS fabricated with silicon gate C<sup>2</sup>MOS technology. It achieve the high speed operation similar to equivalent LSTTL while maintaining the C<sup>2</sup>MOS low power dissipation.

The require 3-state control input  $\bar{G}$  to be set high to place the output into the high impedance.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.



SSOP8-P-0.65

Weight : 0.02g (Typ.)

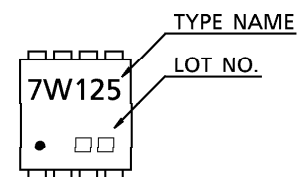
### FEATURES

- High Speed .....  $t_{pd} = 10\text{ns}$  (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.)
- Output Drive Capability ..... 15 LSTTL Loads
- Symmetrical Output Impedance .....  $|I_{OH}| = I_{OL} = 6\text{mA}$  (Min.)
- Balanced Propagation Delays .....  $t_{pLH} \cong t_{pHL}$
- Wide Operating Voltage Range .....  $V_{CC}(\text{opr}) = 2\sim 6\text{V}$

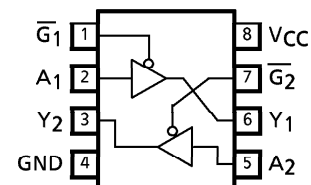
### MAXIMUM RATINGS

| PARAMETER                    | SYMBOL    | VALUE                | UNIT             |
|------------------------------|-----------|----------------------|------------------|
| Supply Voltage Range         | $V_{CC}$  | -0.5~7               | V                |
| DC Input Voltage             | $V_{IN}$  | -0.5~ $V_{CC} + 0.5$ | V                |
| DC Output Voltage            | $V_{OUT}$ | -0.5~ $V_{CC} + 0.5$ | V                |
| Input Diode Current          | $I_{IK}$  | $\pm 20$             | mA               |
| Output Diode Current         | $I_{OK}$  | $\pm 20$             | mA               |
| DC Output Current            | $I_{OUT}$ | $\pm 35$             | mA               |
| DC $V_{CC}$ / Ground Current | $I_{CC}$  | $\pm 37.5$           | mA               |
| Power Dissipation            | $P_D$     | 300                  | mW               |
| Storage Temperature          | $T_{stg}$ | -65~150              | $^\circ\text{C}$ |
| Lead Temperature (10s)       | $T_L$     | 260                  | $^\circ\text{C}$ |

### MARKING



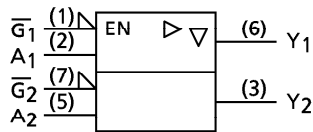
### PIN ASSIGNMENT (TOP VIEW)



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LOGIC DIAGRAM



TRUTH TABLE

| INPUTS    |   | OUTPUTS |
|-----------|---|---------|
| $\bar{G}$ | A | Y       |
| H         | X | Z       |
| L         | L | L       |
| L         | H | H       |

X : Don't Care  
Z : High Impedance

RECOMMENDED OPERATING CONDITIONS

| PARAMETER                | SYMBOL     | VALUE  | UNIT |
|--------------------------|------------|--|------|
| Supply Voltage           | $V_{CC}$   | 2~6  | V    |
| Input Voltage            | $V_{IN}$   | 0~ $V_{CC}$  | V    |
| Output Voltage           | $V_{OUT}$  | 0~ $V_{CC}$  | V    |
| Operating Temperature    | $T_{opr}$  | -40~85   | °C   |
| Input Rise and Fall Time | $t_r, t_f$ | 0~1000 ( $V_{CC} = 2.0V$ )<br>0~500 ( $V_{CC} = 4.5V$ )<br>0~400 ( $V_{CC} = 6.0V$ ) | ns   |

DC ELECTRICAL CHARACTERISTICS

| PARAMETER                        | SYMBOL   | TEST CIRCUIT | TEST CONDITION   | Ta = 25°C                            |      |      | Ta = -40~85°C |      | UNIT      |         |   |
|----------------------------------|----------|--------------|--|--------------------------------------|------|------|---------------|------|-----------|---------|---|
|                                  |          |              |  | $V_{CC}$                             | MIN. | TYP. | MAX.          | MIN. |           | MAX.    |   |
| High-Level Input Voltage         | $V_{IH}$ | —            | —  | 2.0                                  | 1.5  | —    | —             | 1.5  | —         | V       |   |
|                                  |          |              |  | 4.5                                  | 3.15 | —    | —             | 3.15 | —         |         |   |
|                                  |          |              |  | 6.0                                  | 4.2  | —    | —             | 4.2  | —         |         |   |
| Low-Level Input Voltage          | $V_{IL}$ | —            | —  | 2.0                                  | —    | —    | 0.5           | —    | 0.5       | V       |   |
|                                  |          |              |  | 4.5                                  | —    | —    | 1.35          | —    | 1.35      |         |   |
|                                  |          |              |  | 6.0                                  | —    | —    | 1.8           | —    | 1.8       |         |   |
| High-Level Output Voltage        | $V_{OH}$ | —            | $V_{IN} = V_{IH}$ or $V_{IL}$                              | $I_{OH} = -20\mu A$                  | 2.0  | 1.9  | 2.0           | —    | 1.9       | —       | V |
|                                  |          |              |  |                                      | 4.5  | 4.4  | 4.5           | —    | 4.4       | —       |   |
|                                  |          |              |  | $I_{OH} = -6mA$<br>$I_{OH} = -7.8mA$ | 4.5  | 4.18 | 4.31          | —    | 4.13      | —       |   |
|                                  |          |              |  |                                      | 6.0  | 5.68 | 5.80          | —    | 5.63      | —       |   |
| Low-Level Output Voltage         | $V_{OL}$ | —            | $V_{IN} = V_{IL}$  | $I_{OL} = 20\mu A$                   | 2.0  | —    | 0.0           | 0.1  | —         | 0.1     | V |
|                                  |          |              |  |                                      | 4.5  | —    | 0.0           | 0.1  | —         | 0.1     |   |
|                                  |          |              |  | $I_{OL} = 6mA$<br>$I_{OL} = 7.8mA$   | 4.5  | —    | 0.17          | 0.26 | —         | 0.33    |   |
|                                  |          |              |  |                                      | 6.0  | —    | 0.18          | 0.26 | —         | 0.33    |   |
| 3-State Output Off-State Current | $I_{OZ}$ | —            | $V_{IN} = V_{IH}$ or $V_{IL}$<br>$V_{OUT} = V_{CC}$ or GND | 6.0                                  | —    | —    | $\pm 0.5$     | —    | $\pm 5.0$ | $\mu A$ |   |
| Input Leakage Current            | $I_{IN}$ | —            | $V_{IN} = V_{CC}$ or GND                                   | 6.0                                  | —    | —    | $\pm 0.1$     | —    | $\pm 1.0$ |         |   |
| Quiescent Supply Current         | $I_{CC}$ | —            | $V_{IN} = V_{CC}$ or GND                                   | 6.0                                  | —    | —    | 2.0           | —    | 20.0      |         |   |

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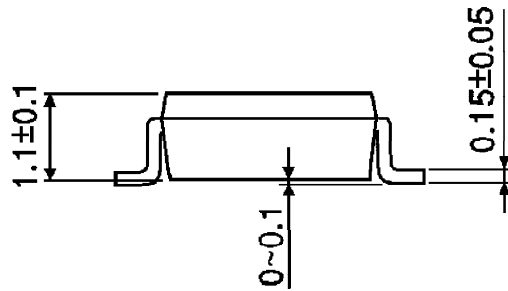
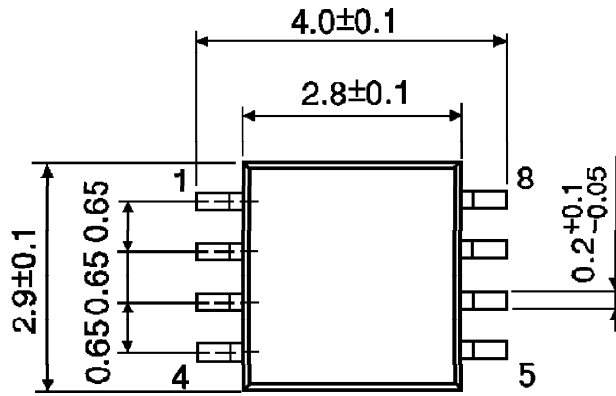
**AC ELECTRICAL CHARACTERISTICS** (Input  $t_r = t_f = 6\text{ns}$ )

| PARAMETER                     | SYMBOL                               | TEST CIRCUIT | TEST CONDITION       |     |     | Ta = 25°C |      |      | Ta = -40~85°C |      | UNIT |
|-------------------------------|--------------------------------------|--------------|----------------------|-----|-----|-----------|------|------|---------------|------|------|
|                               |                                      |              |                      | CL  | VCC | MIN.      | TYP. | MAX. | MIN.          | MAX. |      |
| Output Transition Time        | t <sub>TLH</sub><br>t <sub>THL</sub> | —            | —                    | 50  | 2.0 | —         | 20   | 60   | —             | 75   | ns   |
|                               |                                      |              |                      |     | 4.5 | —         | 6    | 12   | —             | 15   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 5    | 10   | —             | 13   |      |
| Propagation Delay Time        | t <sub>PLH</sub><br>t <sub>pHL</sub> | —            | —                    | 50  | 2.0 | —         | 30   | 90   | —             | 115  |      |
|                               |                                      |              |                      |     | 4.5 | —         | 11   | 18   | —             | 23   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 10   | 15   | —             | 20   |      |
|                               |                                      |              |                      | 150 | 2.0 | —         | 42   | 130  | —             | 165  |      |
|                               |                                      |              |                      |     | 4.5 | —         | 14   | 26   | —             | 33   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 12   | 22   | —             | 28   |      |
| Output Enable Time            | t <sub>pZL</sub><br>t <sub>pZH</sub> | —            | R <sub>L</sub> = 1kΩ | 50  | 2.0 | —         | 30   | 90   | —             | 115  |      |
|                               |                                      |              |                      |     | 4.5 | —         | 11   | 18   | —             | 23   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 10   | 15   | —             | 20   |      |
|                               |                                      |              |                      | 150 | 2.0 | —         | 42   | 130  | —             | 165  |      |
|                               |                                      |              |                      |     | 4.5 | —         | 14   | 26   | —             | 33   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 12   | 22   | —             | 28   |      |
| Output Disable Time           | t <sub>pLZ</sub><br>t <sub>pHZ</sub> | —            | R <sub>L</sub> = 1kΩ | 50  | 2.0 | —         | 24   | 100  | —             | 125  |      |
|                               |                                      |              |                      |     | 4.5 | —         | 12   | 20   | —             | 25   |      |
|                               |                                      |              |                      |     | 6.0 | —         | 10   | 17   | —             | 21   |      |
| Input Capacitance             | C <sub>IN</sub>                      | —            | —                    | —   | —   | —         | 5    | 10   | —             | 10   | pF   |
| Output Capacitance            | C <sub>OUT</sub>                     | —            | —                    | —   | —   | —         | 10   | —    | —             | —    |      |
| Power Dissipation Capacitance | C <sub>PD</sub>                      | —            | Note (1)             | —   | —   | —         | 32   | —    | —             | —    |      |

Note (1) : C<sub>PD</sub> 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 :  
 $I_{CC} (opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 2$  (per Gate)

OUTLINE DRAWING  
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)