

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZ08F, TC7SZ08FU

## 2 INPUT AND GATE

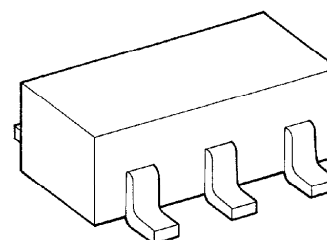
### FEATURES

- High Output Drive :  $\pm 24$  mA (Typ.)  
( $V_{CC} = 3$  V)
- Super High Speed Operation :  $t_{pD} = 2.7$  ns (Typ.)  
( $V_{CC} = 5$  V, 50 pF)
- Operation Voltage Range :  $V_{CC(opr)} = 1.8 \sim 5.5$  V
- Supply Voltage Data Retention :  $V_{CC} = 1.5 \sim 5.5$  V
- 5 V Tolerant Function
- Matches the Performance of TC74LCX Series when Operated at 3.3 V  $V_{CC}$

### MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

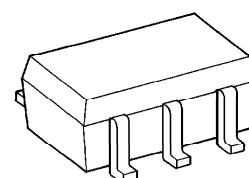
| CHARACTERISTIC              | SYMBOL    | RATING         | UNIT             |
|-----------------------------|-----------|----------------|------------------|
| Supply Voltage Range        | $V_{CC}$  | $-0.5 \sim 6$  | V                |
| DC Input Voltage            | $V_{IN}$  | $-0.5 \sim 6$  | V                |
| DC Output Voltage           | $V_{OUT}$ | $-0.5 \sim 6$  | V                |
| Input Diode Current         | $I_{IK}$  | $\pm 20$       | mA               |
| Output Diode Current        | $I_{OK}$  | $\pm 20$       | mA               |
| DC Output Current           | $I_{OUT}$ | $\pm 50$       | mA               |
| DC $V_{CC}$ /Ground Current | $I_{CC}$  | $\pm 50$       | mA               |
| Power Dissipation           | $P_D$     | 200            | mW               |
| Storage Temperature         | $T_{stg}$ | $-65 \sim 150$ | $^\circ\text{C}$ |
| Lead Temperature (10 s)     | $T_L$     | 260            | $^\circ\text{C}$ |

TC7SZ08F



SSOP5-P-0.95

TC7SZ08FU



SSOP5-P-0.65A

**Weight**

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

980910EBA1

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## DC ELECTRICAL CHARACTERISTICS

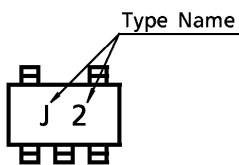
| CHARACTERISTIC            | SYMBOL           | TEST CONDITION                                          |                           | V <sub>CC</sub><br>(V) | Ta = 25°C                 |      |                           | Ta = -40~85°C             |                           | UNIT |
|---------------------------|------------------|---------------------------------------------------------|---------------------------|------------------------|---------------------------|------|---------------------------|---------------------------|---------------------------|------|
|                           |                  |                                                         |                           |                        | MIN.                      | TYP. | MAX.                      | MIN.                      | MAX.                      |      |
| High-Level Input Voltage  | V <sub>IH</sub>  |                                                         |                           | 1.8                    | 0.88<br>× V <sub>CC</sub> | —    | —                         | 0.88<br>× V <sub>CC</sub> | —                         | V    |
|                           |                  |                                                         |                           | 2.3~<br>5.5            | 0.75<br>× V <sub>CC</sub> | —    | —                         | 0.75<br>× V <sub>CC</sub> | —                         |      |
| Low-Level Input Voltage   | V <sub>IL</sub>  |                                                         |                           | 1.8                    | —                         | —    | 0.12<br>× V <sub>CC</sub> | —                         | 0.12<br>× V <sub>CC</sub> | V    |
|                           |                  |                                                         |                           | 2.3~<br>5.5            | —                         | —    | 0.25<br>× V <sub>CC</sub> | —                         | 0.25<br>× V <sub>CC</sub> |      |
| High-Level Output Voltage | V <sub>OH</sub>  | V <sub>IN</sub> = V <sub>IH</sub>                       | I <sub>OH</sub> = -100 μA | 1.8                    | 1.7                       | 1.8  | —                         | 1.7                       | —                         | V    |
|                           |                  |                                                         |                           | 2.3                    | 2.2                       | 2.3  | —                         | 2.2                       | —                         |      |
|                           |                  |                                                         |                           | 3.0                    | 2.9                       | 3.0  | —                         | 2.9                       | —                         |      |
|                           |                  |                                                         |                           | 4.5                    | 4.4                       | 4.5  | —                         | 4.4                       | —                         |      |
|                           |                  |                                                         | I <sub>OH</sub> = -8 mA   | 2.3                    | 1.9                       | 2.15 | —                         | 1.9                       | —                         |      |
|                           |                  |                                                         | I <sub>OH</sub> = -16 mA  | 3.0                    | 2.4                       | 2.8  | —                         | 2.4                       | —                         |      |
|                           |                  |                                                         | I <sub>OH</sub> = -24 mA  | 3.0                    | 2.3                       | 2.68 | —                         | 2.3                       | —                         |      |
|                           |                  |                                                         | I <sub>OH</sub> = -32 mA  | 4.5                    | 3.8                       | 4.2  | —                         | 3.8                       | —                         |      |
| Low-Level Output Voltage  | V <sub>OL</sub>  | V <sub>IN</sub> = V <sub>IH</sub><br>or V <sub>IL</sub> | I <sub>OL</sub> = 100 μA  | 1.8                    | —                         | 0    | 0.1                       | —                         | 0.1                       | V    |
|                           |                  |                                                         |                           | 2.3                    | —                         | 0    | 0.1                       | —                         | 0.1                       |      |
|                           |                  |                                                         |                           | 3.0                    | —                         | 0    | 0.1                       | —                         | 0.1                       |      |
|                           |                  |                                                         |                           | 4.5                    | —                         | 0    | 0.1                       | —                         | 0.1                       |      |
|                           |                  |                                                         | I <sub>OL</sub> = 8 mA    | 2.3                    | —                         | 0.1  | 0.3                       | —                         | 0.3                       |      |
|                           |                  |                                                         | I <sub>OL</sub> = 16 mA   | 3.0                    | —                         | 0.15 | 0.4                       | —                         | 0.4                       |      |
|                           |                  |                                                         | I <sub>OL</sub> = 24 mA   | 3.0                    | —                         | 0.22 | 0.55                      | —                         | 0.55                      |      |
|                           |                  |                                                         | I <sub>OL</sub> = 32 mA   | 4.5                    | —                         | 0.22 | 0.55                      | —                         | 0.55                      |      |
| Input Leakage Current     | I <sub>IN</sub>  | V <sub>IN</sub> = 5.5 V or GND                          |                           | 0~<br>5.5              | —                         | —    | ± 1                       | —                         | ± 10                      | μA   |
| Power Off Leakage Current | I <sub>OFF</sub> | V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V             |                           | 0.0                    | —                         | —    | 1                         | —                         | 10                        | μA   |
| Quiescent Supply Current  | I <sub>CC</sub>  | V <sub>IN</sub> = V <sub>CC</sub> or GND                |                           | 5.5                    | —                         | —    | 2                         | —                         | 20                        | μA   |

AC ELECTRICAL CHARACTERISTICS (Input  $t_r = t_f = 3\text{ ns}$ )

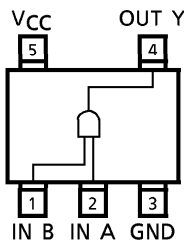
| CHARACTERISTIC                | SYMBOL                               | TEST CONDITION                                    | Ta = 25°C           |      |      |      | Ta = - 40~85°C |      | UNIT |
|-------------------------------|--------------------------------------|---------------------------------------------------|---------------------|------|------|------|----------------|------|------|
|                               |                                      |                                                   | V <sub>CC</sub> (V) | MIN. | TYP. | MAX. | MIN.           | MAX. |      |
| Propagation Delay Time        | t <sub>PLH</sub><br>t <sub>PHL</sub> | C <sub>L</sub> = 15 pF,<br>R <sub>L</sub> = 1 MΩ  | 1.8                 | 2.0  | 5.2  | 10.0 | 2.0            | 10.5 | ns   |
|                               |                                      |                                                   | 2.5 ± 0.2           | 0.8  | 3.4  | 7.0  | 0.8            | 7.5  |      |
|                               |                                      |                                                   | 3.3 ± 0.3           | 0.5  | 2.6  | 4.7  | 0.5            | 5.0  |      |
|                               |                                      |                                                   | 5.0 ± 0.5           | 0.5  | 2.2  | 4.1  | 0.5            | 4.4  |      |
|                               |                                      | C <sub>L</sub> = 50 pF,<br>R <sub>L</sub> = 500 Ω | 3.3 ± 0.3           | 1.5  | 3.3  | 5.2  | 1.5            | 5.5  |      |
|                               |                                      |                                                   | 5.0 ± 0.5           | 0.8  | 2.7  | 4.5  | 0.8            | 4.8  |      |
| Input Capacitance             | C <sub>IN</sub>                      |                                                   | 0~5.5               | —    | 4    | —    | —              | pF   |      |
| Power Dissipation Capacitance | C <sub>PD</sub>                      | (Note 1)                                          | 3.3                 | —    | 20   | —    | —              | —    | pF   |
|                               |                                      |                                                   | 5.5                 | —    | 25   | —    | —              | —    |      |

(Note 1) CPD 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.  
 $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

MARKING



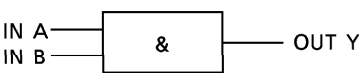
PIN ASSIGNMENT (TOP VIEW)



TRUTH TABLE

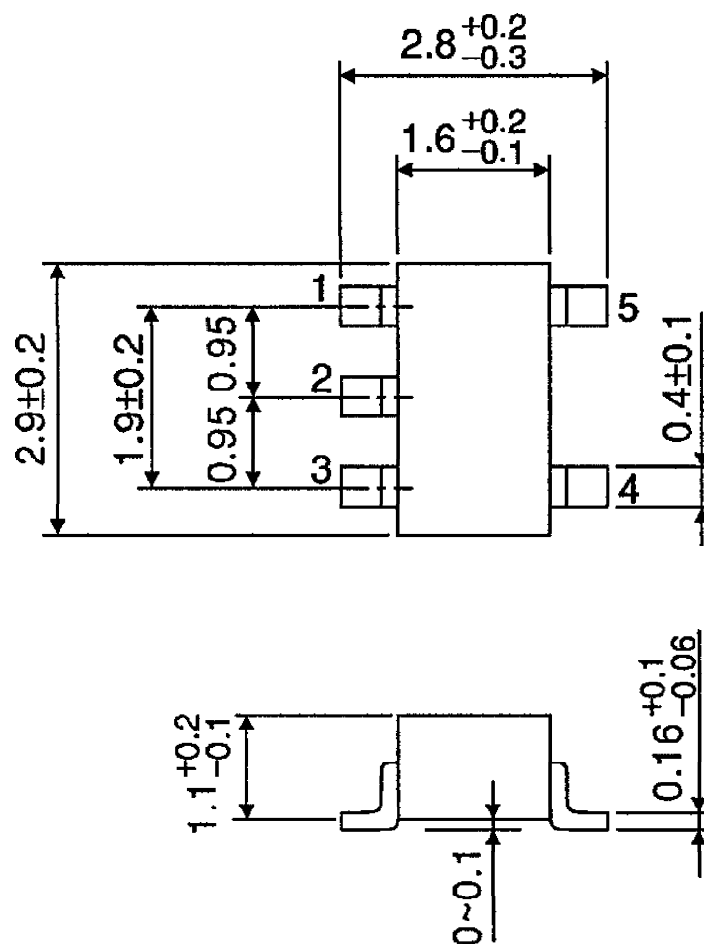
| A | B | Y |
|---|---|---|
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

LOGIC DIAGRAM



OUTLINE DRAWING  
SSOP5-P-0.95

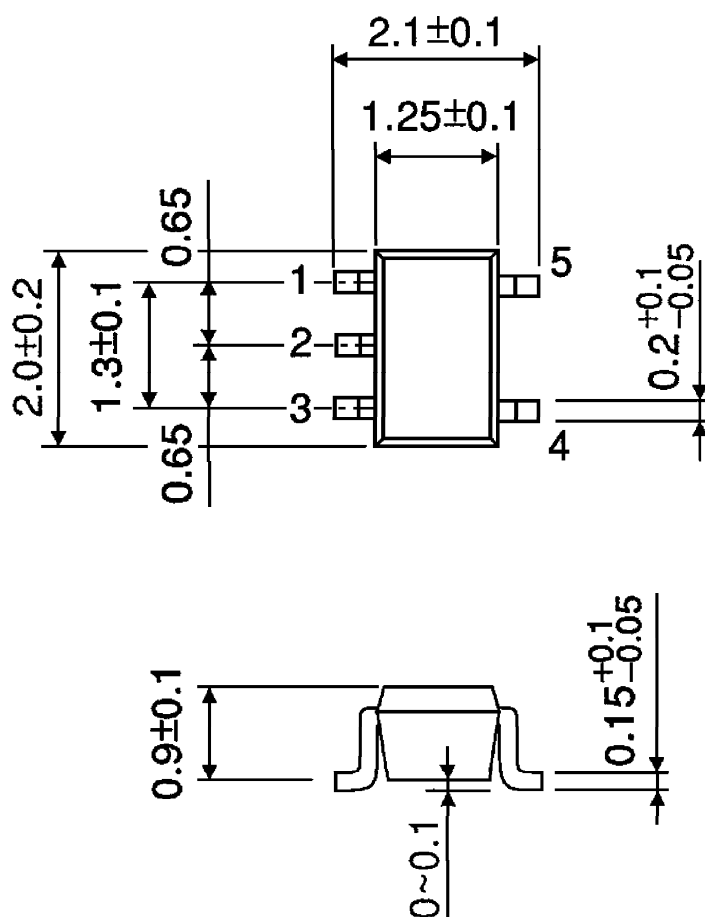
Unit : mm



Weight : 0.016 g (Typ.)

OUTLINE DRAWING  
SSOP5-P-0.65A

Unit : mm



Weight : 0.006 g (Typ.)