TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

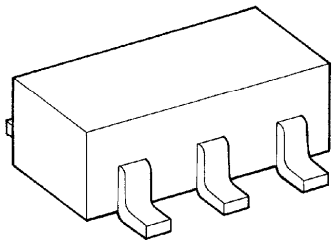
# TC7SZ08F, TC7SZ08FU

## 2 INPUT AND GATE

**FEATURES**

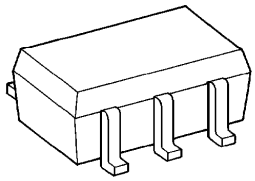
- High Output Drive : ±24mA (Typ.) ($V_{CC}$ = 3V)
- Super High Speed Operation : $t_{PD}$ = 2.7ns (Typ.) ($V_{CC}$ = 5V, 50pF)
- Operation Voltage Range : $V_{CC\,(opr)}$ = 1.8~5.5V
- 5V Toleratnt Function
- Matches the Performance of TC74LCX Series when Operated at 3.3V $V_{CC}$

TC7SZ08F



SSOP5-P-0.95

TC7SZ08FU



SSOP5-P-0.65A

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

**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Supply Voltage Range | $V_{CC}$ | −0.5~6 | V |
| DC Input Voltage | $V_{IN}$ | −0.5~6 | V |
| DC Output Voltage | $V_{OUT}$ | −0.5~6 | V |
| Input Diode Current | $I_{IK}$ | ±20 | mA |
| Output Diode Current | $I_{OK}$ | ±20 | mA |
| DC Output Current | $I_{OUT}$ | ±50 | 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 (10s) | $T_L$ | 260 | °C |

**DC ELECTRICAL CHARACTERISTICS**

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

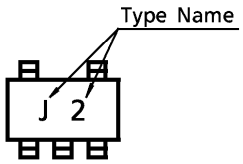
**AC ELECTRICAL CHARACTERISTICS** (Input $t_r = t_f = 3ns$)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | $V_{CC}$ (V) | Ta = 25°C | | | Ta = −40~85°C | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN. | TYP. | MAX. | MIN. | MAX. | |
| Propagation Delay Time | $t_{PLH}$ $t_{PHL}$ | $C_L = 15pF$, $R_L = 1M\Omega$ | 1.8 | 2.0 | 5.2 | 9.5 | 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 | |
| | | $C_L = 50pF$, $R_L = 500\Omega$ | 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 | $C_{IN}$ | | 0~5.5 | — | 4 | — | — | — | pF |
| Power Dissipation Capacitance | $C_{PD}$ | (Note 1) | 3.3 | — | 20 | — | — | — | pF |
| | | | 5.5 | — | 25 | — | — | — | |

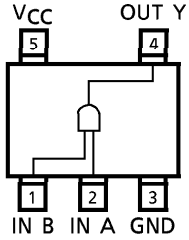
(Note 1) : $C_{PD}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation.

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

**MARKING**



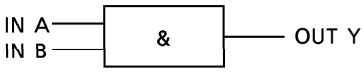

**PIN ASSIGNMENT** (TOP VIEW)




**TRUTH TABLE**

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

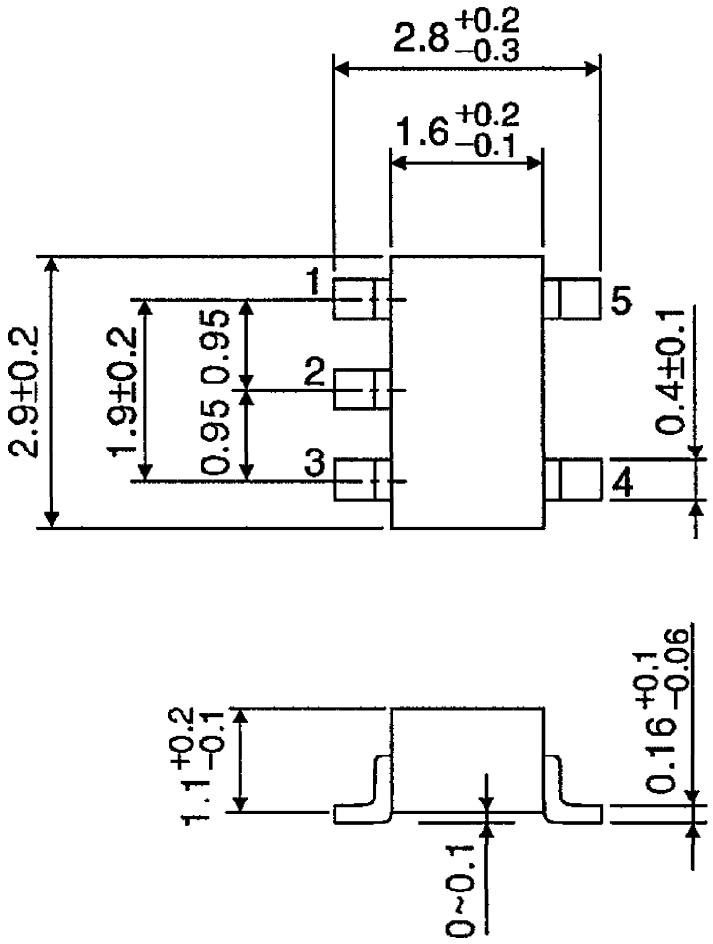
**LOGIC DIAGRAM**



**OUTLINE DRAWING**

SSOP5-P-0.95

Unit : mm

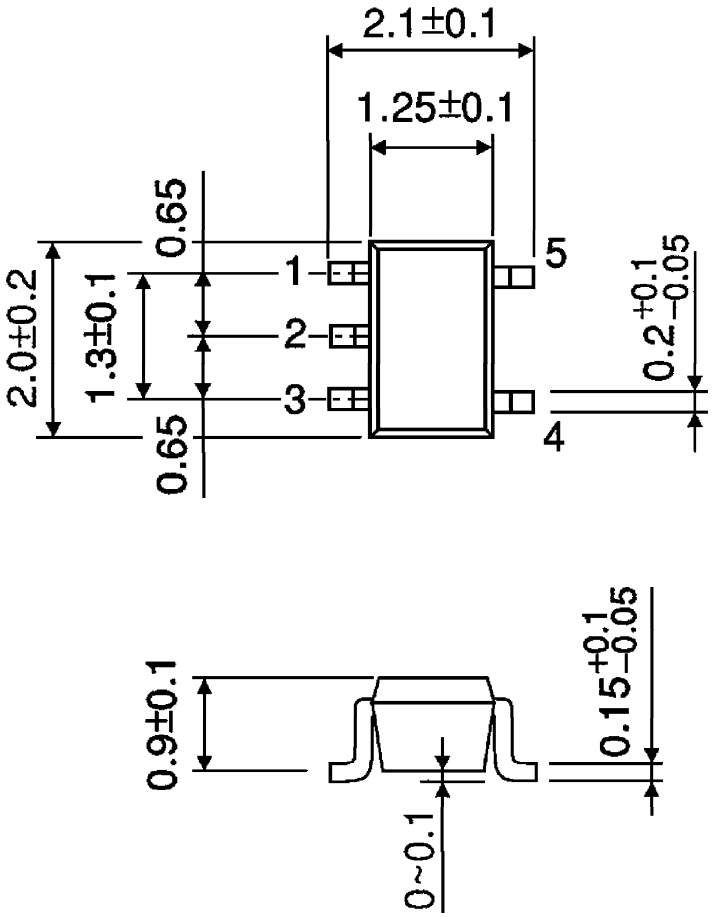



Weight : 0.016g (Typ.)

**OUTLINE DRAWING**

SSOP5-P-0.65A

Unit : mm




Weight : 0.006g (Typ.)