

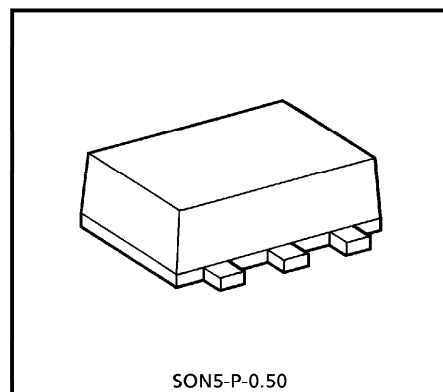
TENTATIVE  
(UNDER DEVELOPMENT) TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZ08AFE

## 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
- Latch-up Performance :  $\pm 500$  mA
- ESD Performance : Human Body Model  $> \pm 2000$  V  
Machine Model  $> \pm 200$  V
- Power Down Protection is provided on all inputs.
- Matches the Performance of TC74LCX Series when Operated at 3.3 V  $V_{CC}$
- Input Rise and Fall Time ( $t_r$ ,  $t_f$ ) (Recommended Operation Condition)
  - @ $V_{CC} = 1.8$  V,  $2.5$  V  $\pm 0.2$  V : 0~20 ns/V
  - @ $V_{CC} = 3.3$  V  $\pm 0.3$  V : 0~10 ns/V
  - @ $V_{CC} = 5.5$  V  $\pm 0.5$  V : 0~5 ns/V



SON5-P-0.50

Weight : 0.003 g (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~ $V_{CC} + 0.5$ | V    |
| Input Diode Current         | $I_{IK}$  | $\pm 20$             | mA   |
| Output Diode Current        | $I_{OK}$  | $\pm 20$             | mA   |
| DC Output Current           | $I_{OUT}$ | $\pm 50$             | mA   |
| DC $V_{CC}$ /Ground Current | $I_{CC}$  | $\pm 50$             | mA   |
| Power Dissipation           | $P_D$     | 150                  | mW   |
| Storage Temperature         | $T_{stg}$ | -65~150              | °C   |
| Lead Temperature (10 s)     | $T_L$     | 260                  | °C   |

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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                       | 0.75<br>× V <sub>CC</sub> | —    | —                         | 0.75<br>× V <sub>CC</sub> | —                         | V    |   |
|                           |                 |   | 2.3 –<br>5.5              | 0.7 ×<br>V <sub>CC</sub>  | —    | —                         | 0.7 ×<br>V <sub>CC</sub>  | —                         |      |   |
| Low-Level Input Voltage   | V <sub>IL</sub> |   | 1.8                       | —                         | —    | 0.25<br>× V <sub>CC</sub> | —                         | 0.25<br>× V <sub>CC</sub> | V    |   |
|                           |                 |   | 2.3 –<br>5.5              | —                         | —    | 0.3 ×<br>V <sub>CC</sub>  | —                         | 0.3 ×<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   |   |
| Quiescent Supply Current  | I <sub>CC</sub> | V <sub>IN</sub> = V <sub>CC</sub> or GND                | 5.5                       | —                         | —    | 2                         | —                         | 20                        | μA   |   |

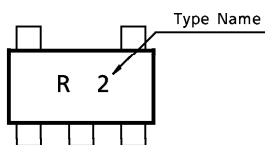
**AC ELECTRICAL CHARACTERISTICS** (Input  $t_r = t_f = 3 \text{ ns}$ )

| CHARACTERISTIC                | SYMBOL                               | TEST CONDITION                                    | V <sub>CC</sub> (V) | Ta = 25°C |      |      | Ta = -40~85°C |      | UNIT |
|-------------------------------|--------------------------------------|---|---------------------|-----------|------|------|---------------|------|------|
|                               |                                      |   |                     | 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  | 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 <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                 | —         | 19   | —    | —             | pF   |      |
|                               |                                      |   | 5.5                 | —         | 26   | —    | —             |      |      |

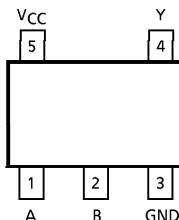
(Note 1) : C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.  
Average operating current can be obtained by the equation.

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

**MARKING**



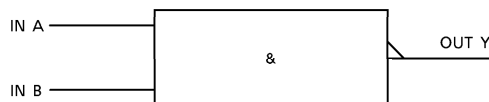
**PIN ASSIGNMENT (TOP VIEW)**



**TRUTH TABLE**

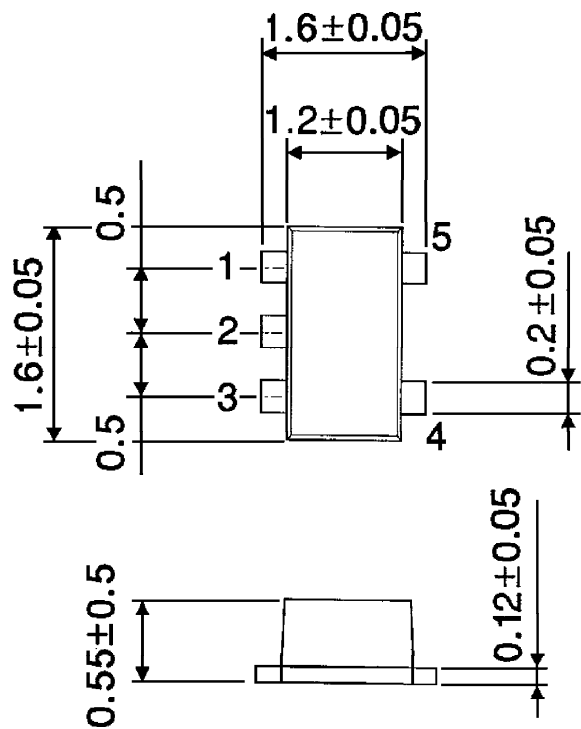
| A | B | Y |
|---|---|---|
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

**LOGIC DIAGRAM**



OUTLINE DRAWING  
SON5-P-0.50

Unit : mm



Weight : 0.003 g (Typ.)