

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZ02F, TC7SZ02FU

## 2 INPUT NOR GATE

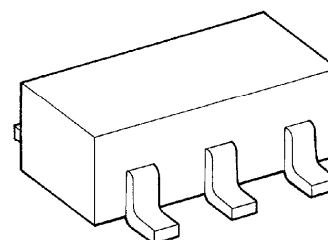
### FEATURES

- High Output Drive :  $\pm 24\text{mA}$  (Typ.) ( $V_{CC} = 3\text{V}$ )
- Super High Speed Operation :  $t_{PD} = 2.4\text{ns}$  (Typ.)  
( $V_{CC} = 5\text{V}$ ,  $50\text{pF}$ )
- Operation Voltage Range :  $V_{CC}(\text{opr}) = 1.8 \sim 5.5\text{V}$
- 5V Tolerant Function
- Matches the Performance of TC74LCX Series when Operated at  $3.3\text{V } V_{CC}$

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

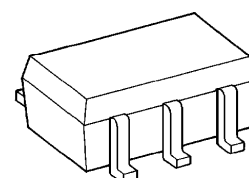
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	$V_{CC}$	$-0.5 \sim 6$	V
DC Input Voltage	$V_{IN}$	$-0.5 \sim 6$	V
DC Output Voltage	$V_{OUT}$	$-0.5 \sim 6$	V
Input Diode Current	$I_{IK}$	$\pm 20$	mA
Output Diode Current	$I_{OK}$	$\pm 20$	mA
DC Output Current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ / 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 (10s)	$T_L$	260	$^\circ\text{C}$

TC7SZ02F



SSOP5-P-0.95

TC7SZ02FU



SSOP5-P-0.65A

### Weight

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

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## DC ELECTRICAL CHARACTERISTICS

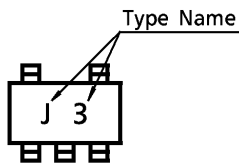
CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Input Voltage	V <sub>IH</sub>		1.8	0.88 × V <sub>CC</sub>	—	—	0.88 × V <sub>CC</sub>	—	V
			2.3~5.5	0.75 × V <sub>CC</sub>	—	—	0.75 × V <sub>CC</sub>	—	V
Low-Level Input Voltage	V <sub>IL</sub>		1.8	—	—	0.12 × V <sub>CC</sub>	—	0.12 × V <sub>CC</sub>	V
			2.3~5.5	—	—	0.25 × V <sub>CC</sub>	—	0.25 × V <sub>CC</sub>	V
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -100μA	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> = -8mA	2.3	1.9	2.15	—	1.9	V
			I <sub>OH</sub> = -16mA	3.0	2.4	2.8	—	2.4	
			I <sub>OH</sub> = -24mA	3.0	2.3	2.68	—	2.3	
			I <sub>OH</sub> = -32mA	4.5	3.8	4.2	—	3.8	
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = 100μA	1.8	—	0	0.1	—	V
				2.3	—	0	0.1	—	
				3.0	—	0	0.1	—	
				4.5	—	0	0.1	—	
			I <sub>OH</sub> = 8mA	2.3	—	0.1	0.3	—	V
			I <sub>OH</sub> = 16mA	3.0	—	0.15	0.4	—	
			I <sub>OH</sub> = 24mA	3.0	—	0.22	0.55	—	
			I <sub>OH</sub> = 32mA	4.5	—	0.22	0.55	—	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5V or GND	0~5.5	—	—	±1	—	±10	μA
Power Off Leakage Current	I <sub>OFF</sub>	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5V	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  $t_r = t_f = 3\text{ns}$ )

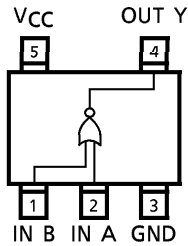
CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = - 40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t <sub>PLH</sub> t <sub>PHL</sub>	C <sub>L</sub> = 15pF, R <sub>L</sub> = 1MΩ	1.8	2.0	4.4	9.5	2.0	10.0	ns
			2.5 ± 0.2	0.8	2.9	6.5	0.8	7.0	
			3.3 ± 0.3	0.5	2.3	4.5	0.5	4.7	
			5.0 ± 0.5	0.5	1.9	3.9	0.5	4.1	
		C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω	3.3 ± 0.3	1.5	2.9	5.0	1.5	5.2	
			5.0 ± 0.5	0.8	2.4	4.3	0.8	4.5	
Input Capacitance	C <sub>IN</sub>		0~5.5	—	4	—	—	—	pF
Power Dissipation Capacitance	C <sub>PD</sub>	(Note 1)	3.3	—	23	—	—	—	pF
			5.5	—	30	—	—	—	

(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



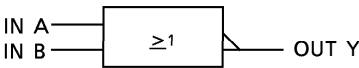
PIN ASSIGNMENT (TOP VIEW)



TRUTH TABLE

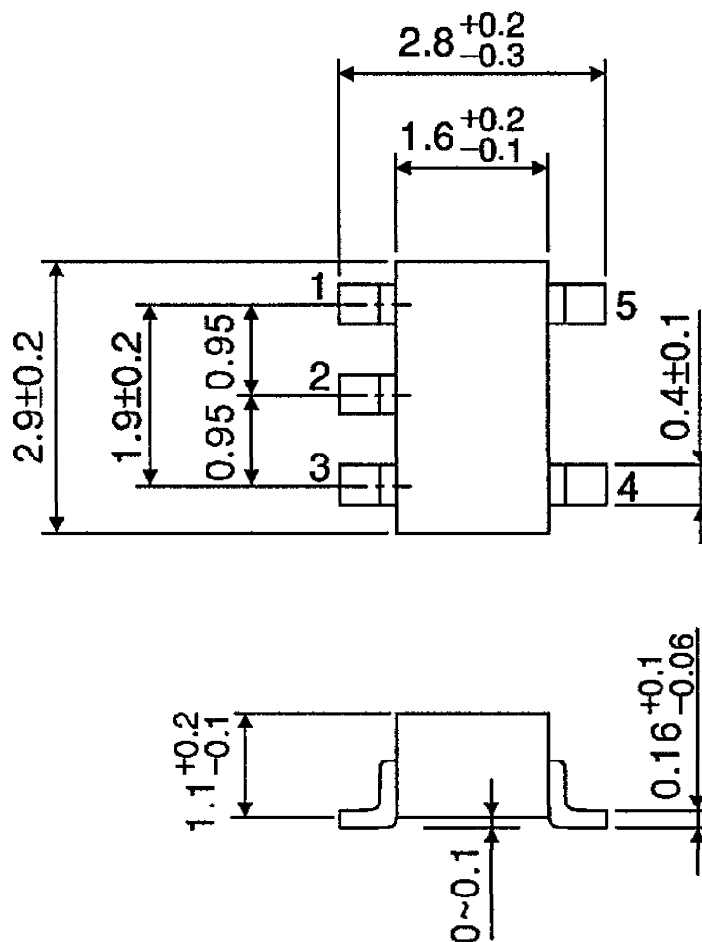
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

LOGIC DIAGRAM



OUTLINE DRAWING  
SSOP5-P-0.95

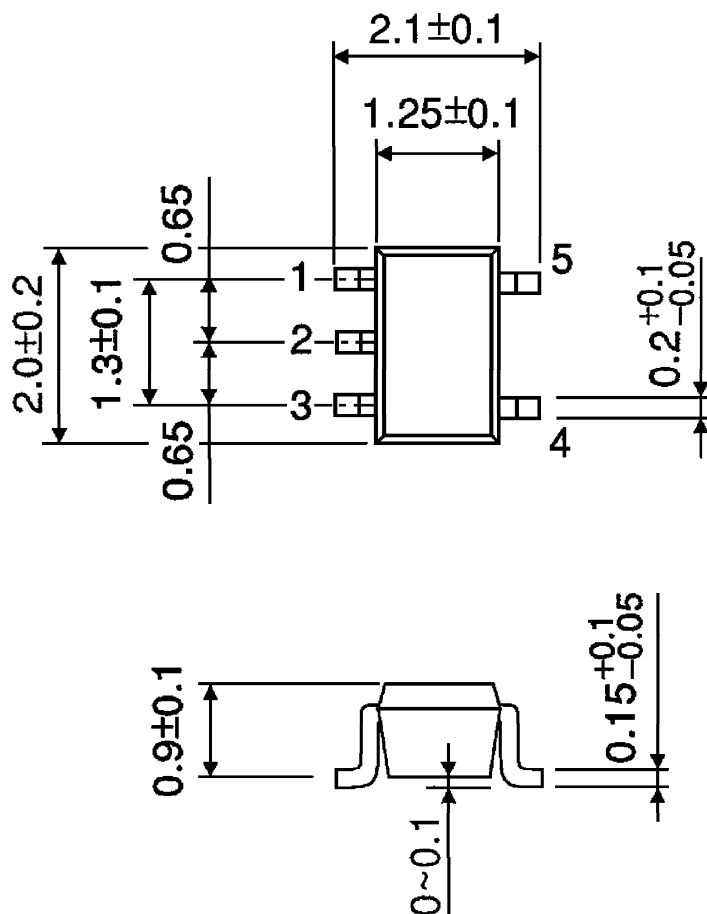
Unit : mm



Weight : 0.016g (Typ.)

OUTLINE DRAWING  
SSOP5-P-0.65A

Unit : mm



Weight : 0.006g (Typ.)