

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZ04F, TC7SZ04FU

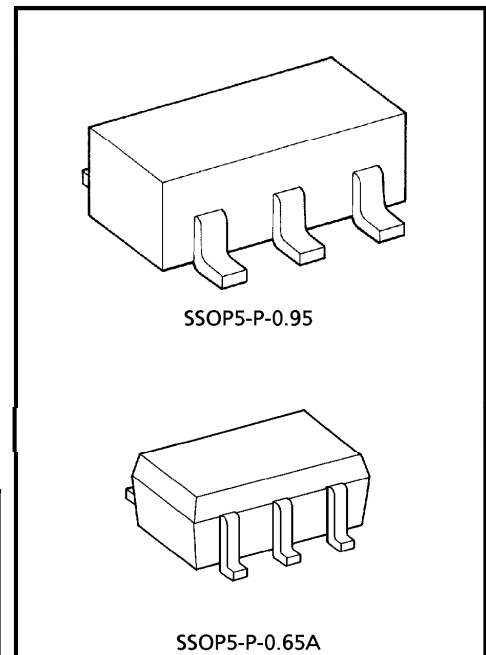
## INVERTER

### 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.) @ $V_{CC} = 5\text{V}$ ,  
50pF
- 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 3.3V  $V_{CC}$

### 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	$I_{IK}$	$\pm 20$	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	$T_{stg}$	- 65~150	°C
Lead Temperature (10s)	$T_L$	260	°C



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

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**DC ELECTRICAL CHARACTERISTICS**

CHARACTERISTIC	SYM-BOL	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>	—					
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>					
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IL</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> = -8mA	I <sub>OH</sub> = -16mA	I <sub>OH</sub> = -24mA	I <sub>OH</sub> = -32mA	2.3	1.9	2.15	—	1.9	—	V
							3.0	2.4	2.8	—	2.4	—	
							3.0	2.3	2.68	—	2.3	—	
4.5	3.8	4.2	—	3.8	—								
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OH</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>OH</sub> = 8mA	I <sub>OH</sub> = 16mA	I <sub>OH</sub> = 24mA	I <sub>OH</sub> = 32mA	2.3	—	0.1	0.3	—	0.3	V
							3.0	—	0.15	0.4	—	0.4	
							3.0	—	0.22	0.55	—	0.55	
4.5	—	0.22	0.55	—	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				

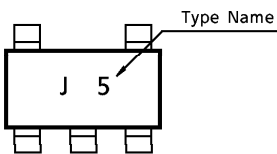
**AC ELECTRICAL CHARACTERISTICS** (Input  $t_r = t_f = 3\text{ns}$ )

CHARACTERISTIC	SYM-BOL	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>	CL = 15pF, RL = 1MΩ	1.8	2.0	
2.5 ± 0.2	0.8	2.9	6.5				0.8	7.0	
3.3 ± 0.3	0.5	2.1	4.5				0.5	4.7	
5.0 ± 0.5	0.5	1.8	3.9				0.5	4.1	
CL = 50pF, RL = 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	—	20	—	—	—	pF
			5.5	—	26	—	—	—	

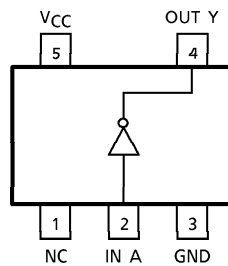
(Note 1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.  
Average operating current can be obtained by the equation.

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

**MARKING**



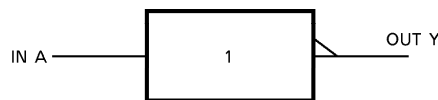
**PIN ASSIGNMENT (TOP VIEW)**



**TRUTH TABLE**

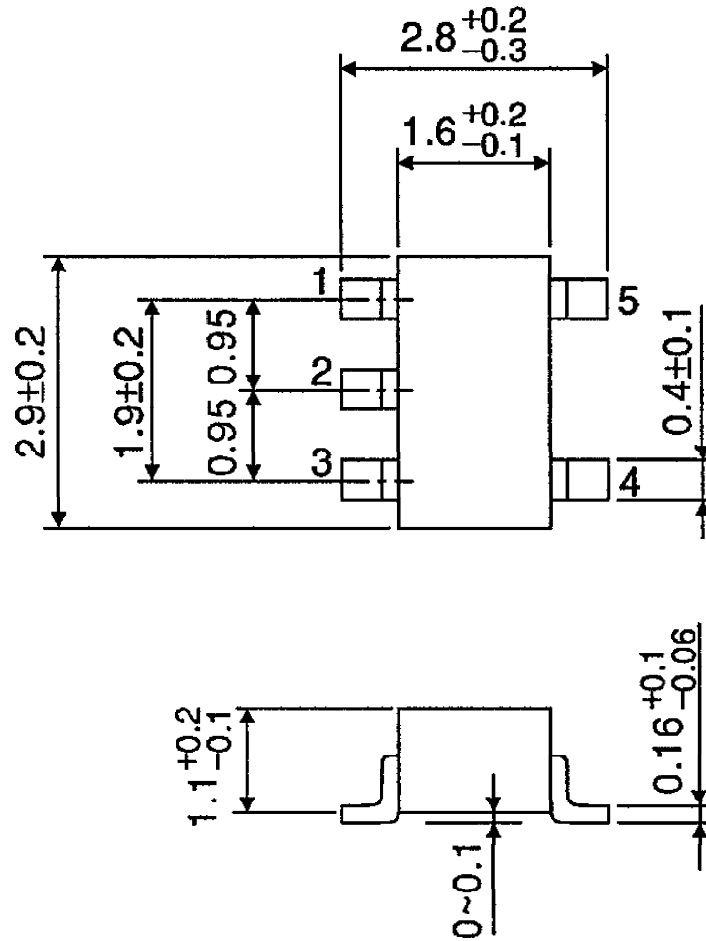
A	Y
L	H
H	L

**LOGIC DIAGRAM**



OUTLINE DRAWING  
SSOP5-P-0.95

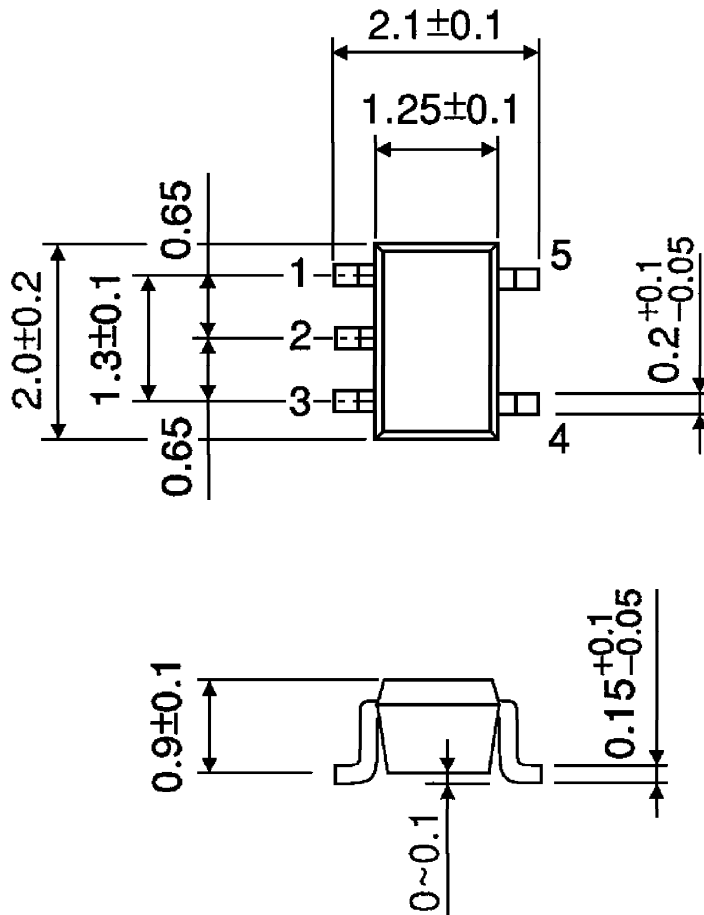
Unit : mm



Weight : 0.016g (Typ.)

OUTLINE DRAWING  
SSOP5-P-0.65A

Unit : mm



Weight : 0.006g (Typ.)