

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZU04F, TC7SZU04FU

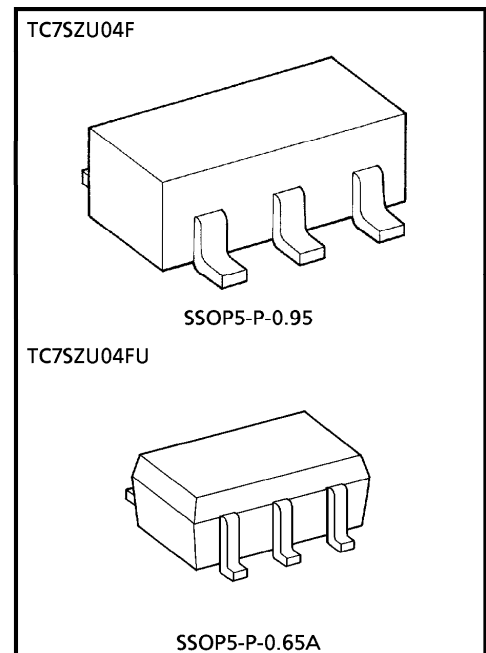
## INVERTER (UNBUFFER)

### FEATURES

- High Output Drive :  $\pm 16\text{mA}$  (Typ.) @ $V_{CC} = 4.5\text{V}$
- Super High Speed Operation :  $t_{pD} 2.4\text{ns}$  (Typ.)  
@ $V_{CC} = 5\text{V}, 50\text{pF}$
- Operation Voltage Range :  $V_{CC}(\text{opr}) = 1.8\sim 5.5\text{V}$

### 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	$P_D$	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	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 - 2.7	0.85 × V <sub>CC</sub>	—	—	0.85 × V <sub>CC</sub>	—	V		
			3.0 - 5.5	0.8 × V <sub>CC</sub>	—	—	0.8 × V <sub>CC</sub>	—			
Low-Level Input Voltage	V <sub>IL</sub>		1.8 - 2.7	—	—	0.15 × V <sub>CC</sub>	—	0.15 × V <sub>CC</sub>	V		
			3.0 - 5.5	—	—	0.2 × V <sub>CC</sub>	—	0.2 × 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	1.6	1.8	—	1.6	V		
				2.3	2.1	2.3	—	2.1			
				3.0	2.7	3.0	—	2.7			
			I <sub>OH</sub> = -4mA	4.5	4.0	4.4	—	4.0		—	
				I <sub>OH</sub> = -8mA	2.3	1.9	2.14	—		1.9	—
				I <sub>OH</sub> = -12mA	3.0	2.4	2.75	—		2.4	—
				I <sub>OH</sub> = -16mA	3.0	2.3	2.61	—		2.3	—
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	0.2	—	0.2	V	
				2.3	—	0	0.2	—	0.2		
				3.0	—	0	0.3	—	0.3		
			I <sub>OH</sub> = 4mA	4.5	—	0	0.5	—	0.5		
				I <sub>OH</sub> = 8mA	2.3	—	0.1	0.3	—		0.3
				I <sub>OH</sub> = 12mA	3.0	—	0.17	0.4	—		0.4
				I <sub>OH</sub> = 16mA	3.0	—	0.25	0.55	—		0.55
Input Leakage Current	I <sub>IIN</sub>	V <sub>IN</sub> = 5.5V or GND	0 - 5.5	—	—	±1	—	±10	μA		
			5.5	—	—	2	—	20	μA		

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

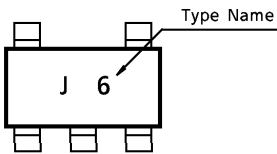
CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT	
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Propagation Delay Time	t <sub>PLH</sub> t <sub>PHL</sub>	C <sub>L</sub> = 15pF, R <sub>L</sub> = 1MΩ	1.8	1.0	—	8.5	1.0	9.0	ns
			2.5 ± 0.2	0.8	—	6.2	0.8	6.5	
			3.3 ± 0.3	0.5	—	4.5	0.5	4.8	
			5.0 ± 0.5	0.5	—	3.9	0.5	4.1	
		C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω	3.3 ± 0.3	1.0	—	6.0	1.5	6.5	
			5.0 ± 0.5	0.8	—	5.0	0.8	5.5	
Input Capacitance	C <sub>IN</sub>		0 - 5.5	—	4.5	—	—	pF	
Power Dissipation Capacitance	C <sub>PD</sub>	(Note 1)	3.3	—	6.3	—	—	pF	
			5.5	—	9.5	—	—		

(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.

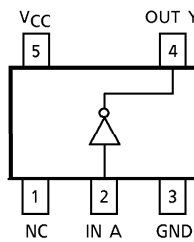
Average operating current can be obtained by the equation.

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

**MARKING**



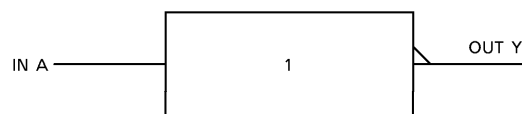
**PIN ASSIGNMENT (TOP VIEW)**



**TRUTH TABLE**

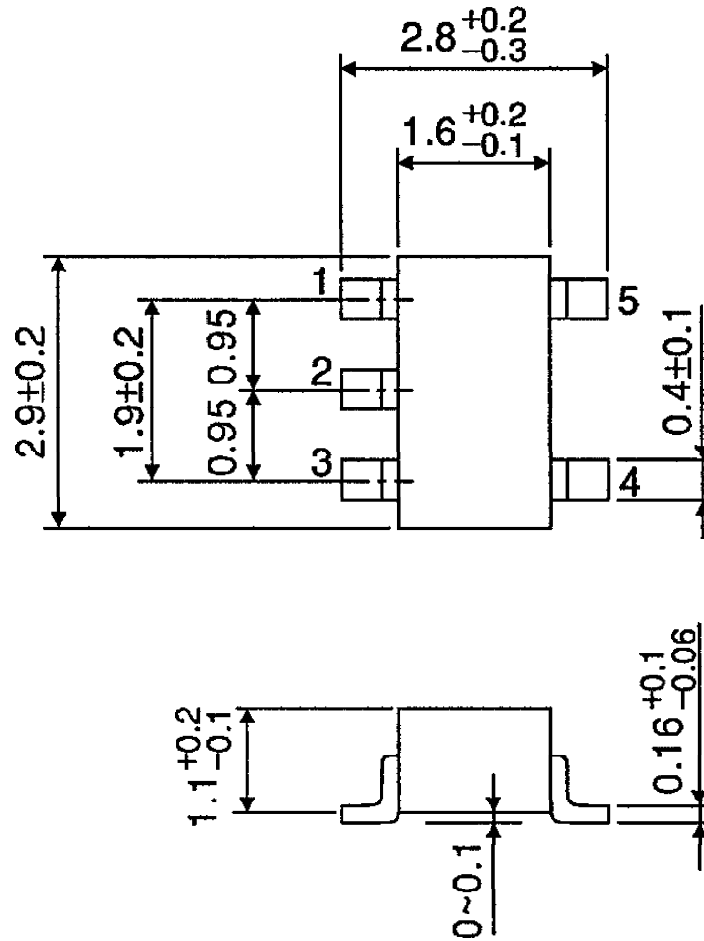
A	Y
L	H
H	L

**LOGIC DIAGRAM**



OUTLINE DRAWING  
SSOP5-P-0.95

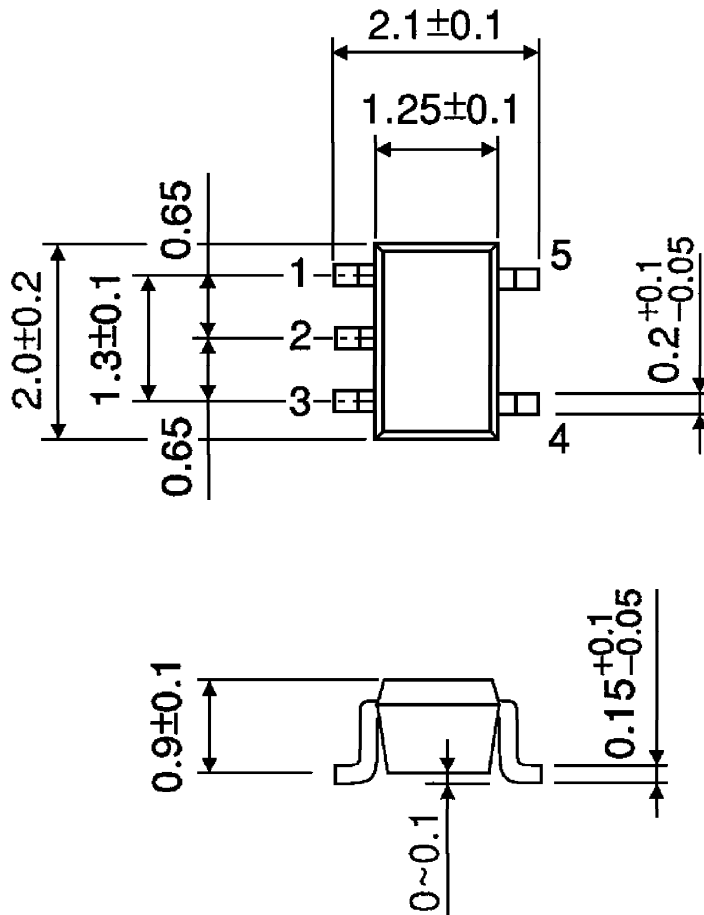
Unit : mm



Weight : 0.016g (Typ.)

OUTLINE DRAWING  
SSOP5-P-0.65A

Unit : mm



Weight : 0.006g (Typ.)