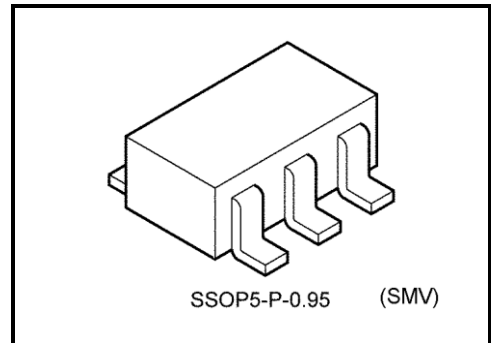


# TC7SET04F

## INVERTER

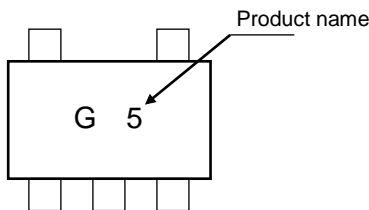
### Features

- High speed :  $t_{pd} = 5.0 \text{ ns (typ.)}$   
at  $V_{CC} = 5 \text{ V}$ ,  $C_L = 15 \text{ pF}$
- Low power dissipation :  $I_{CC} = 2 \mu\text{A (max)}$  at  $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs :  $V_{IL} = 0.8 \text{ V (max)}$   
 $V_{IH} = 2.0 \text{ V (min)}$
- 5.5-V tolerant input
- Balanced Propagation Delays :  $t_{pLH} \approx t_{pHL}$



Weight: 0.016 g (typ.)

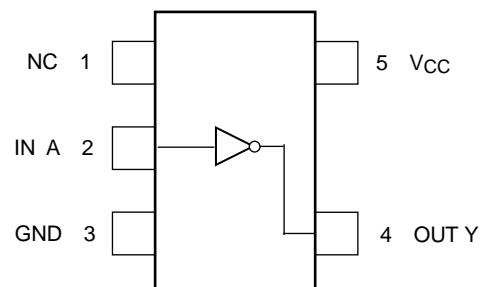
### Marking



### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	-0.5 to 7.0	V
DC input voltage	$V_{IN}$	-0.5 to 7.0	V
DC output voltage	$V_{OUT}$	-0.5 to $V_{CC} + 0.5$	V
Input diode current	$I_{IK}$	-20	mA
Output diode current	$I_{OK}$	$\pm 20$ (Note 1)	mA
DC output current	$I_{OUT}$	$\pm 25$	mA
DC $V_{CC}$ /ground current	$I_{CC}$	$\pm 50$	mA
Power dissipation	$P_D$	200	mW
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$
Lead Temperature (10s)	$T_L$	260	$^\circ\text{C}$

### Pin Assignment (top view)



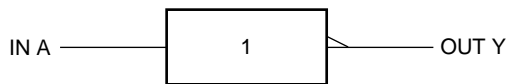
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1:  $V_{OUT} < GND$ ,  $V_{OUT} > V_{CC}$

Start of commercial production  
1996-09

## IEC Logic Symbol



## Truth Table

A	Y
L	H
H	L

## Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	4.5 to 5.5	V
Input voltage	$V_{IN}$	0 to 5.5	V
Output voltage	$V_{OUT}$	0 to $V_{CC}$	V
Operating temperature	$T_{opr}$	-40 to 85	°C
Input rise and fall time	dt/dv	0 to 20	ns/V

## Electrical Characteristics

### DC Characteristics

Characteristics	Symbol	Test Condition	VCC (V)	Ta = 25°C			Ta = -40 to 85°C		Unit	
				Min	Typ.	Max	Min	Max		
High-level input voltage	$V_{IH}$	—	4.5 to 5.5	2.0	—	—	2.0	—	V	
Low-level input voltage	$V_{IL}$	—	4.5 to 5.5	—	—	0.8	—	0.8		
High-level output voltage	$V_{OH}$	$V_{IN} = V_{IL}$	$I_{OH} = -50 \mu A$	4.5	4.4	4.5	—	4.4	—	V
			$I_{OH} = -8 \text{ mA}$	4.5	3.94	—	—	3.80	—	
Low-level output voltage	$V_{OL}$	$V_{IN} = V_{IH}$	$I_{OL} = 50 \mu A$	4.5	—	0.0	0.10	—	0.10	
			$I_{OL} = 8 \text{ mA}$	4.5	—	—	0.36	—	0.44	
Input leakage current	$I_{IN}$	$V_{IN} = 5.5 \text{ V or GND}$	0 to 5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu A$	
Quiescent supply current	$I_{CC}$	$V_{IN} = V_{CC} \text{ or GND}$	5.5	—	—	2.0	—	20.0	$\mu A$	
	$I_{CCT}$	$V_{IN} = 3.4 \text{ V}$	5.5	—	—	1.35	—	1.50	mA	

**AC Characteristics (input:  $t_r = t_f = 3 \text{ ns}$ )**

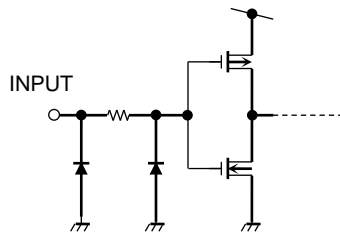
Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit
		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t <sub>pLH</sub> t <sub>pHL</sub>	5.0 ± 0.5	15	—	5.0	7.0	1.0	8.0	ns
			50	—	8.0	10.5	1.0	12.0	
Input capacitance	C <sub>IN</sub>	—		—	4	10	—	10	pF
Power dissipation capacitance	C <sub>PD</sub>	(Note 2)		—	17	—	—	—	pF

Note 2: CPD 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:

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

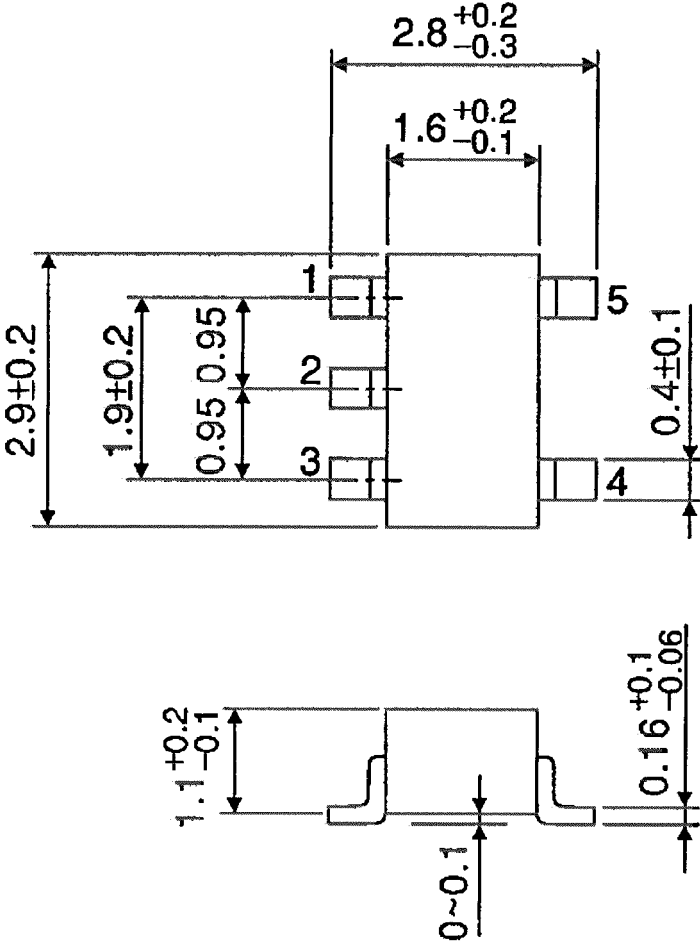
**INPUT EQUIVALENT CIRCUIT**



Package Dimensions

SSOP5-P-0.95

Unit : mm



Weight: 0.016 g (typ.)

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