

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

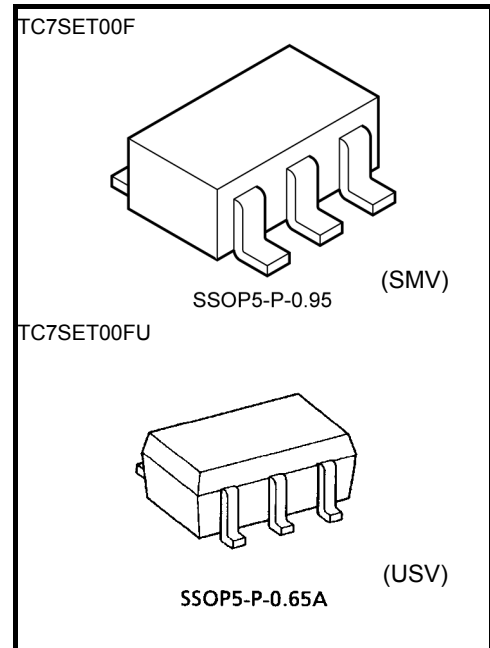
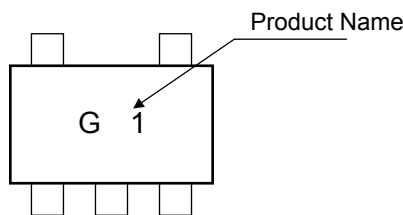
# TC7SET00F, TC7SET00FU

## 2 Input NAND Gate

### Features

- High Speed :  $t_{pd} = 4.2\text{ns}$  (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 inputs.
- Balanced Propagation Delays :  $t_{pLH} \cong t_{pHL}$

### Marking

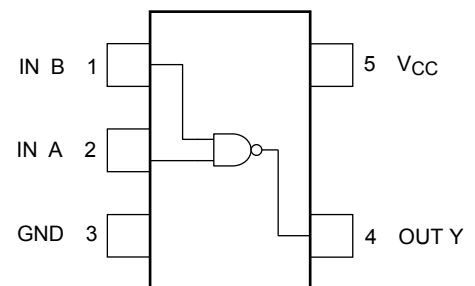


Weight  
 SSOP5-P-0.95 : 0.016 g (typ.)  
 SSOP5-P-0.65A : 0.006 g (typ.)

### Absolute Maximum Ratings (Ta = 25°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	°C
Lead temperature (10s)	$T_L$	260	°C

### Pin Assignment (top view)

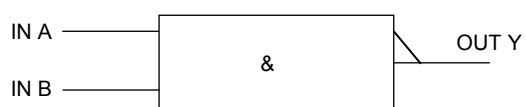


Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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:  $V_{OUT} < GND$ ,  $V_{OUT} > V_{CC}$

## IEC Logic Symbol



## Truth Table

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
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	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to 85°C		Unit	
				Min	Typ.	Max	Min	Max		
High-level input voltage	V <sub>IH</sub>		4.5 to 5.5	2.0	—	—	2.0	—	V	
Low-level input voltage	V <sub>IL</sub>		4.5 to 5.5	—	—	0.8	—	0.8	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> = -50 μA	4.5	4.4	4.5	—	4.4	—	V
			I <sub>OH</sub> = -8mA	4.5	3.94	—	—	3.80	—	
Low-level output voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OL</sub> = 50 μA	4.5	—	0.0	0.10	—	0.10	V
			I <sub>OL</sub> = 8 mA	4.5	—	—	0.36	—	0.44	
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5 V or GND	0 to 5.5	—	—	±0.1	—	±1.0	μA	
Quiescent supply current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	2.0	—	20.0	μA	
	I <sub>CC(T)</sub>	PER INPUT : V <sub>IN</sub> = 3.4V OTHER INPUT: V <sub>CC</sub> or GND	5.5	—	—	1.35	—	1.50	mA	

## AC Characteristics (Input: $t_r = t_f = 3 \text{ ns}$ )

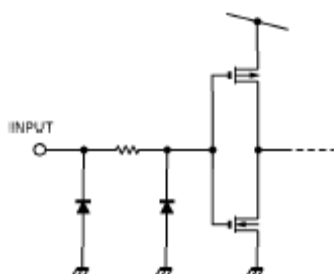
Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit		
			V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	Min	Typ.	Max		Min	Max
Propagation delay time	t <sub>pLH</sub>		5.0±0.5	15	—	4.2	6.2	1.0	7.1	ns
	t <sub>pHL</sub>			50	—	6.5	9.0	1.0	10.3	
Input capacitance	C <sub>IN</sub>				—	4	10	—	10	pF
Power dissipation capacitance	C <sub>PD</sub>	(Note 2)			—	17	—	—	—	pF

Note 2: 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:

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

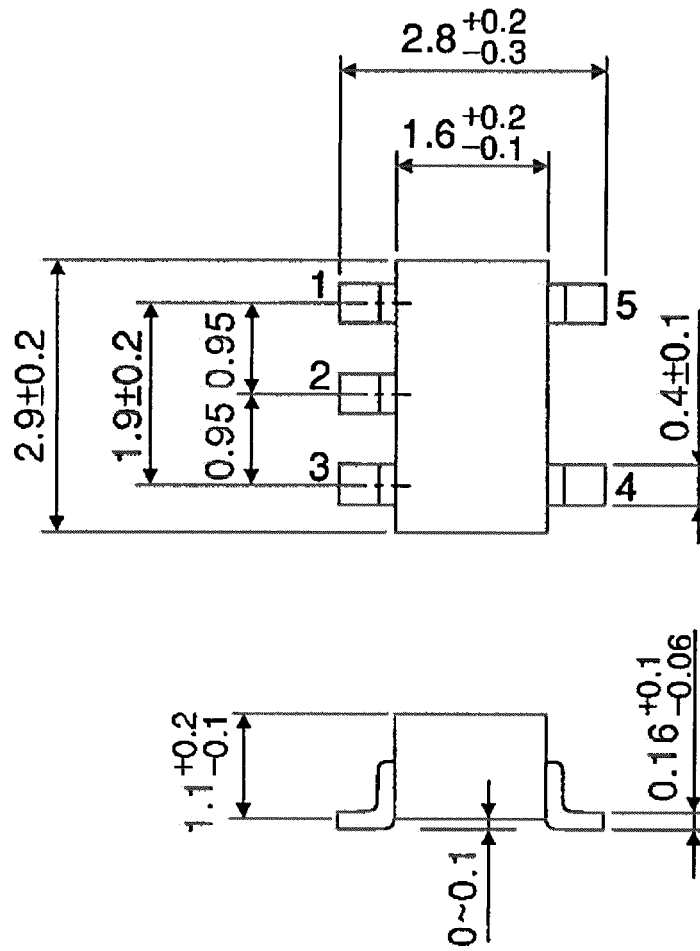
### INPUT EQUIVALENT CIRCUIT



## Package Dimensions

SSOP5-P-0.95

Unit : mm

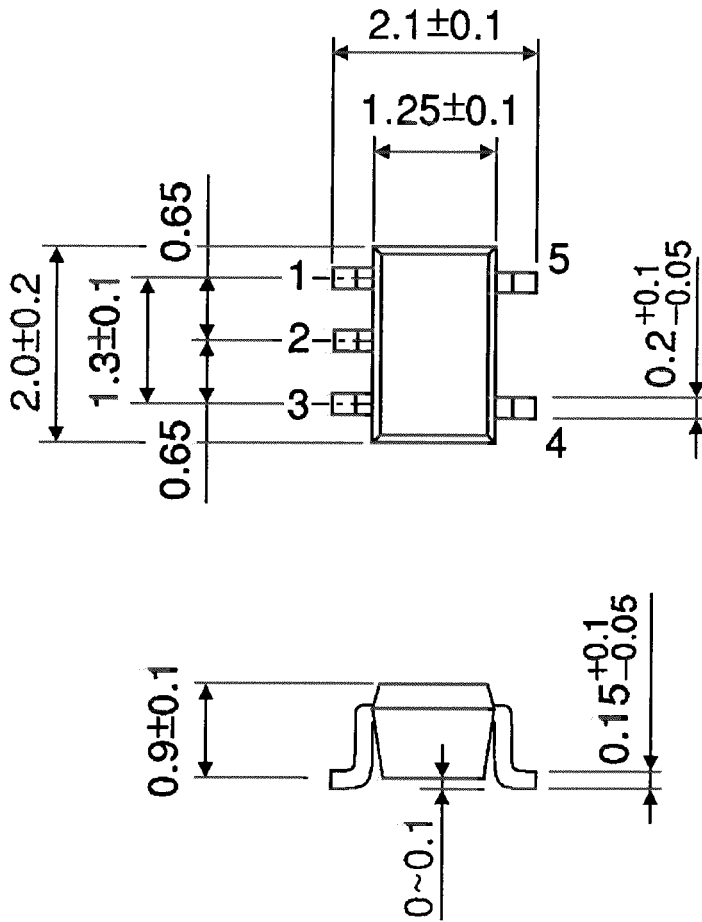


Weight: 0.016 g (typ.)

## Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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