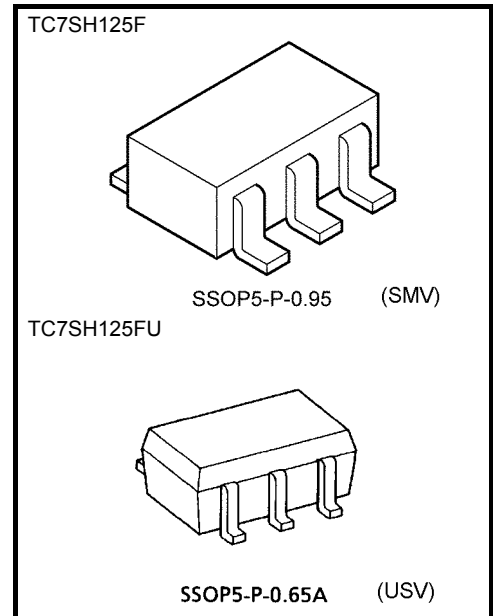


# TC7SH125F, TC7SH125FU

## Bus Buffer 3-STATE Output

### Features

- High speed:  $t_{pd} = 3.8\text{ns}$  (typ.) at  $V_{CC} = 5\text{V}$ ,  $15\text{pF}$
- Low power dissipation:  $I_{CC} = 2\mu\text{A}$  (max) at  $T_a = 25^\circ\text{C}$
- High noise immunity:  $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (min)
- 5.5 V tolerant input.
- Wide operating voltage range:  $V_{CC} = 2$  to  $5.5\text{V}$

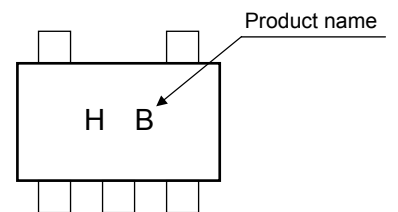


Weight  
 SSOP5-P-0.95 : 0.016 g (typ.)  
 SSOP5-P-0.65A : 0.006 g (typ.)

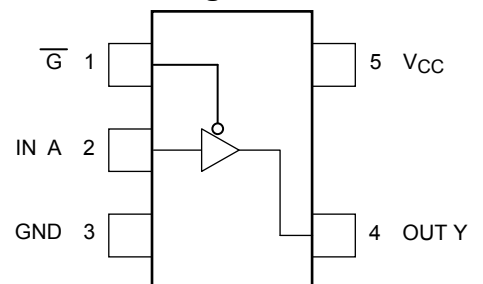
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Supply voltage range	$V_{CC}$	-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 (10 s)	$T_L$	260	$^\circ\text{C}$

### Marking



### Pin Assignment (top view)

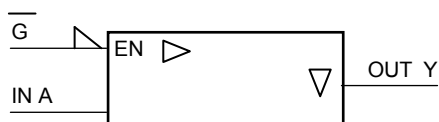


Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

$\overline{G}$	A	Y
H	X	Z
L	L	L
L	H	H

## Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	2 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 100 ( $V_{CC} = 3.3 V \pm 0.3 V$ )	ns/V
		0 to 20 ( $V_{CC} = 5 V \pm 0.5 V$ )	

## Electrical Characteristics

### DC Characteristics

Characteristics	Symbol	Test Condition	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit		
			$V_{CC}$ (V)	Min	Typ.	Max	Min		Max	
High-level input voltage	$V_{IH}$	—	2.0	1.5	—	—	1.5	—	V	
			3.0 to 5.5	$V_{CC} \times 0.7$	—	—	$V_{CC} \times 0.7$	—		
Low-level input voltage	$V_{IL}$	—	2.0	—	—	0.5	—	0.5	V	
			3.0 to 5.5	—	—	$V_{CC} \times 0.3$	—	$V_{CC} \times 0.3$		
High-level output voltage	$V_{OH}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OH} = -50 \mu\text{A}$	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			$I_{OH} = -4 \text{ mA}$	3.0	2.58	—	—	2.48	—	
				4.5	3.94	—	—	3.80	—	
Low-level output voltage	$V_{OL}$	$V_{IN} = V_{IL}$	$I_{OL} = 50 \mu\text{A}$	2.0	—	0	0.1	—	0.1	V
				3.0	—	0	0.1	—	0.1	
				4.5	—	0	0.1	—	0.1	
			$I_{OL} = 4 \text{ mA}$	3.0	—	—	0.36	—	0.44	
				4.5	—	—	0.36	—	0.44	
3-state output off-state current	$I_{OZ}$	$V_{IN} = V_{IH}$ or $V_{IL}$ $V_{OUT} = V_{CC}$ or GND	5.5	—	—	$\pm 0.25$	—	$\pm 2.5$	$\mu\text{A}$	
Input leakage current	$I_{IN}$	$V_{IN} = 5.5 \text{ V}$ or GND	0 to 5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	
Quiescent supply current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	2.0	—	20.0	$\mu\text{A}$	

## AC Characteristics (unless otherwise specified, input: $t_r = t_f = 3 \text{ ns}$ )

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit
		VCC (V)	CL (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t <sub>pLH</sub>	3.3 ± 0.3	15	—	5.6	8.0	1.0	9.5	ns
			50	—	8.1	11.5	1.0	13.0	
	5.0 ± 0.5	15	—	3.8	5.5	1.0	6.5		
		50	—	5.3	7.5	1.0	8.5		
3-state output enable time	t <sub>pZL</sub>	3.3 ± 0.3	15	—	5.4	8.0	1.0	9.5	ns
			50	—	7.9	11.5	1.0	13.0	
	5.0 ± 0.5	15	—	3.6	5.1	1.0	6.0		
		50	—	5.1	7.1	1.0	8.0		
3-state output disable time	t <sub>pLZ</sub>	3.3 ± 0.3	50	—	9.5	13.2	1.0	15.0	ns
	t <sub>pHZ</sub>	5.0 ± 0.5	50	—	6.1	8.8	1.0	10.0	
Input capacitance	C <sub>IN</sub>			—	4	10	—	10	pF
Output capacitance	C <sub>OUT</sub>			—	6	—	—	—	pF
Power dissipation capacitance	C <sub>PD</sub>	(Note 2)		—	14	—	—	—	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.

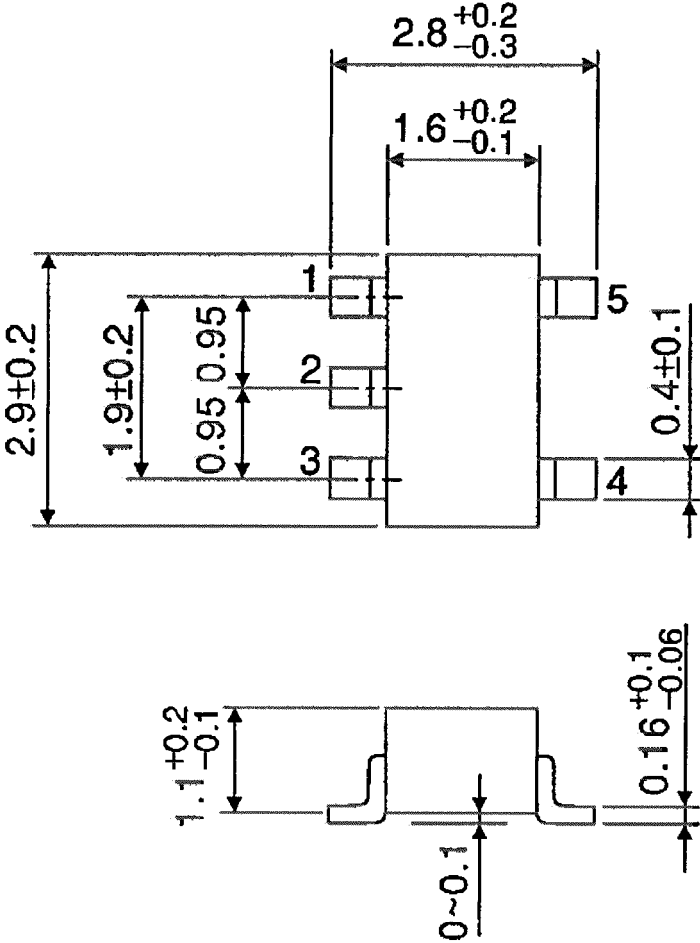
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP5-P-0.95

Unit : mm

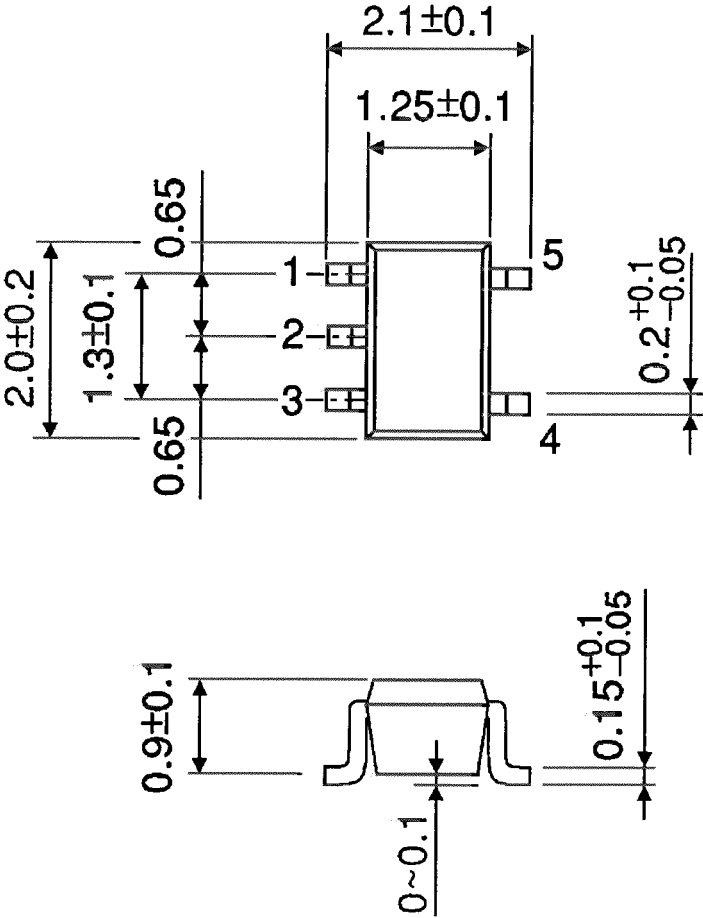


Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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