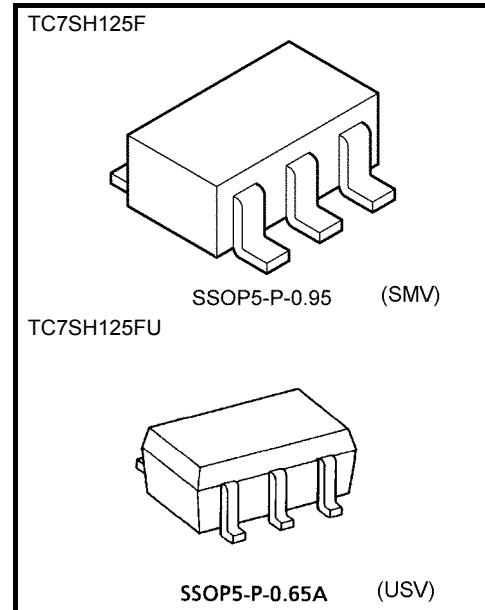


TC7SH125F, TC7SH125FU

Bus Buffer 3-STATE Output

Features

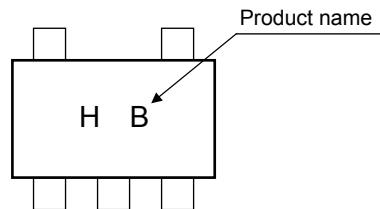
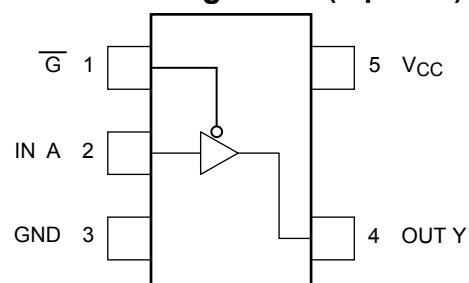
- High speed: $t_{pd} = 3.8\text{ns}$ (typ.) at $V_{CC} = 5\text{V}$, 15pF
- Low power dissipation: $I_{CC} = 2\mu\text{A}$ (max) at $T_a = 25^\circ\text{C}$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- 5.5 V tolerant input.
- Wide operating voltage range: $V_{CC} = 2$ to 5.5V



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}	±20 (Note 1)	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC} /ground current	I_{CC}	±50	mA
Power dissipation	P_D	200	mW
Storage temperature	T_{STG}	−65 to 150	°C
Lead temperature (10 s)	T_L	260	°C

Marking**Pin Assignment (top view)**

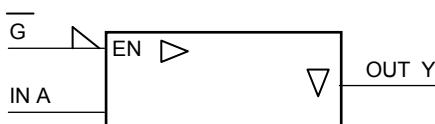
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

Start of commercial production
2004-05

IEC Logic Symbol



Truth Table

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 ($V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$)			ns/V
		0 to 20 ($V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$)			

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition	V_{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit
				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	
			$I_{OH} = -8 \text{ mA}$	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	—	V
				3.0	—	0	0.1	—	
				4.5	—	0	0.1	—	
			$I_{OL} = 4 \text{ mA}$	3.0	—	—	0.36	—	
			$I_{OL} = 8 \text{ mA}$	4.5	—	—	0.36	—	
3-state output off-state current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5	—	—	± 0.25	—	± 2.5	μA
Input leakage current	I_{IN}	$V_{IN} = 5.5 \text{ V}$ or GND	0 to 5.5	—	—	± 0.1	—	± 1.0	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	2.0	—	20.0	μA

AC Characteristics (unless otherwise specified, input: $t_r = t_f = 3$ ns)

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

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

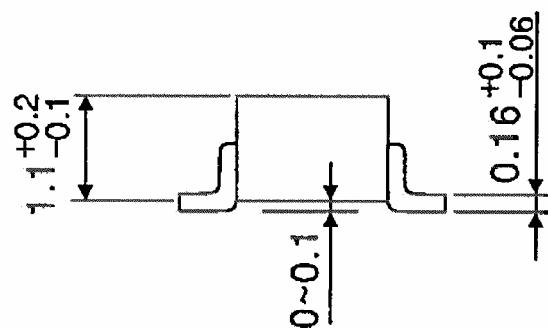
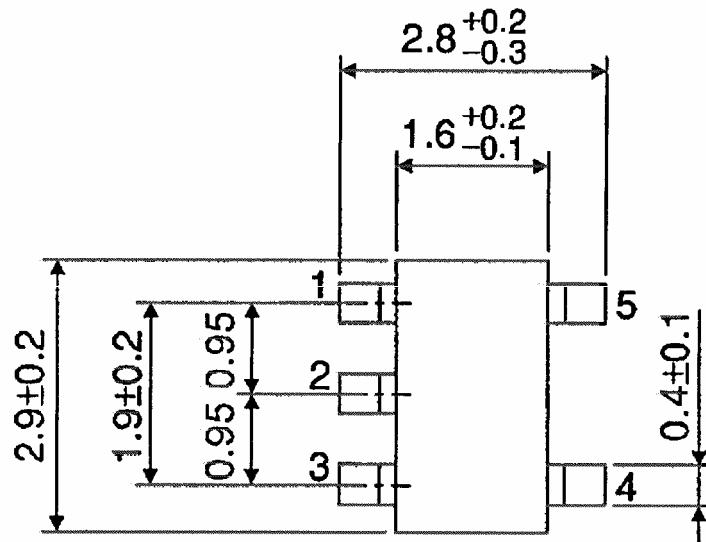
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP5-P-0.95

Unit : mm

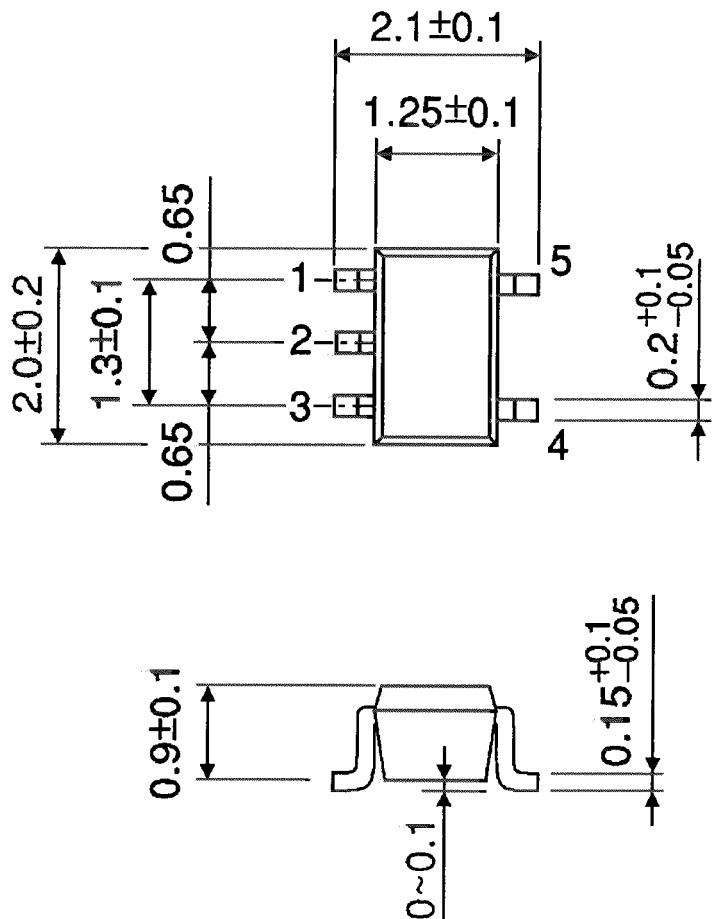


Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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