

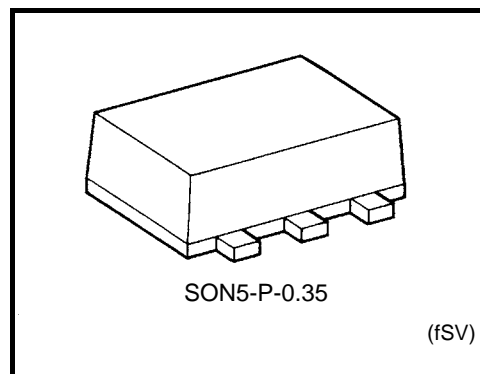
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7SH125FS

Bus Buffer

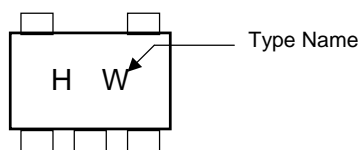
## Features

High speed:  $t_{pd} = 3.8 \text{ ns}$  (typ.) at  $V_{CC} = 5 \text{ V}$   
 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)  
 5.5V tolerant input.  
 Wide operating voltage range:  $V_{CC} (\text{opr}) = 2 \sim 5.5 \text{ V}$

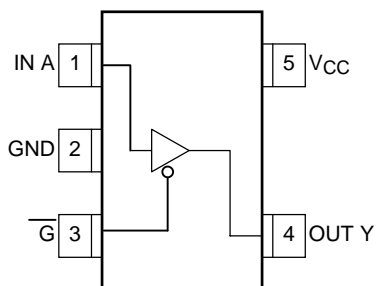


Weight : 0.001 g (Typ.)

## Marking



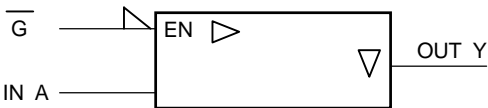
## Pin Assignment (top view)



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V <sub>CC</sub>	−0.5~7.0	V
DC input voltage	V <sub>IN</sub>	−0.5~7.0	V
DC output voltage	V <sub>OUT</sub>	−0.5~V <sub>CC</sub> + 0.5	V
Input diode current	I <sub>IK</sub>	−20	mA
Output diode current	I <sub>OK</sub>	±20	mA
DC output current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /ground current	I <sub>CC</sub>	±50	mA
Power dissipation	P <sub>D</sub>	50	mW
Storage temperature	T <sub>stg</sub>	−65~150	°C

Logic Diagram



Truth Table

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

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	2.0~5.5	V
Input voltage	V <sub>IN</sub>	0~5.5	V
Output voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	−40~85	°C
Input rise and fall time	dt/dv	0~100 (V <sub>CC</sub> = 3.3 ± 0.3 V)	ns/V
		0~20 (V <sub>CC</sub> = 5 ± 0.5 V)	

**Electrical Characteristics**
**DC Characteristics**

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit
					V <sub>CC</sub> (V)	Min	Typ.	Max	Min	Max
High-level input voltage	V <sub>IH</sub>	—	—	—	2.0	1.5	—	—	1.5	—
					3.0~5.5	V <sub>CC</sub> × 0.7	—	—	V <sub>CC</sub> × 0.7	—
Low-level input voltage	V <sub>IL</sub>	—	—	—	2.0	—	—	0.50	—	0.50
					3.0~5.5	—	—	V <sub>CC</sub> × 0.3	—	V <sub>CC</sub> × 0.3
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	2.0	1.9	2.0	—	1.9	—
					3.0	2.9	3.0	—	2.9	—
					4.5	4.4	4.5	—	4.4	—
				I <sub>OH</sub> = -4 mA	3.0	2.58	—	—	2.48	—
				I <sub>OH</sub> = -8 mA	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	2.0	—	0	0.1	—	0.1
					3.0	—	0	0.1	—	0.1
					4.5	—	0	0.1	—	0.1
				I <sub>OL</sub> = 4 mA	3.0	—	—	0.36	—	0.44
				I <sub>OL</sub> = 8 mA	4.5	—	—	0.36	—	0.44
3-state output off-state current	I <sub>OZ</sub>	—	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND		5.5	—	—	±0.25	—	±2.5
Input leakage current	I <sub>IN</sub>	—	V <sub>IN</sub> = 5.5 V or GND		0~5.5	—	—	±0.1	—	±1.0
Quiescent supply current	I <sub>CC</sub>	—	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	2.0	—	20.0

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

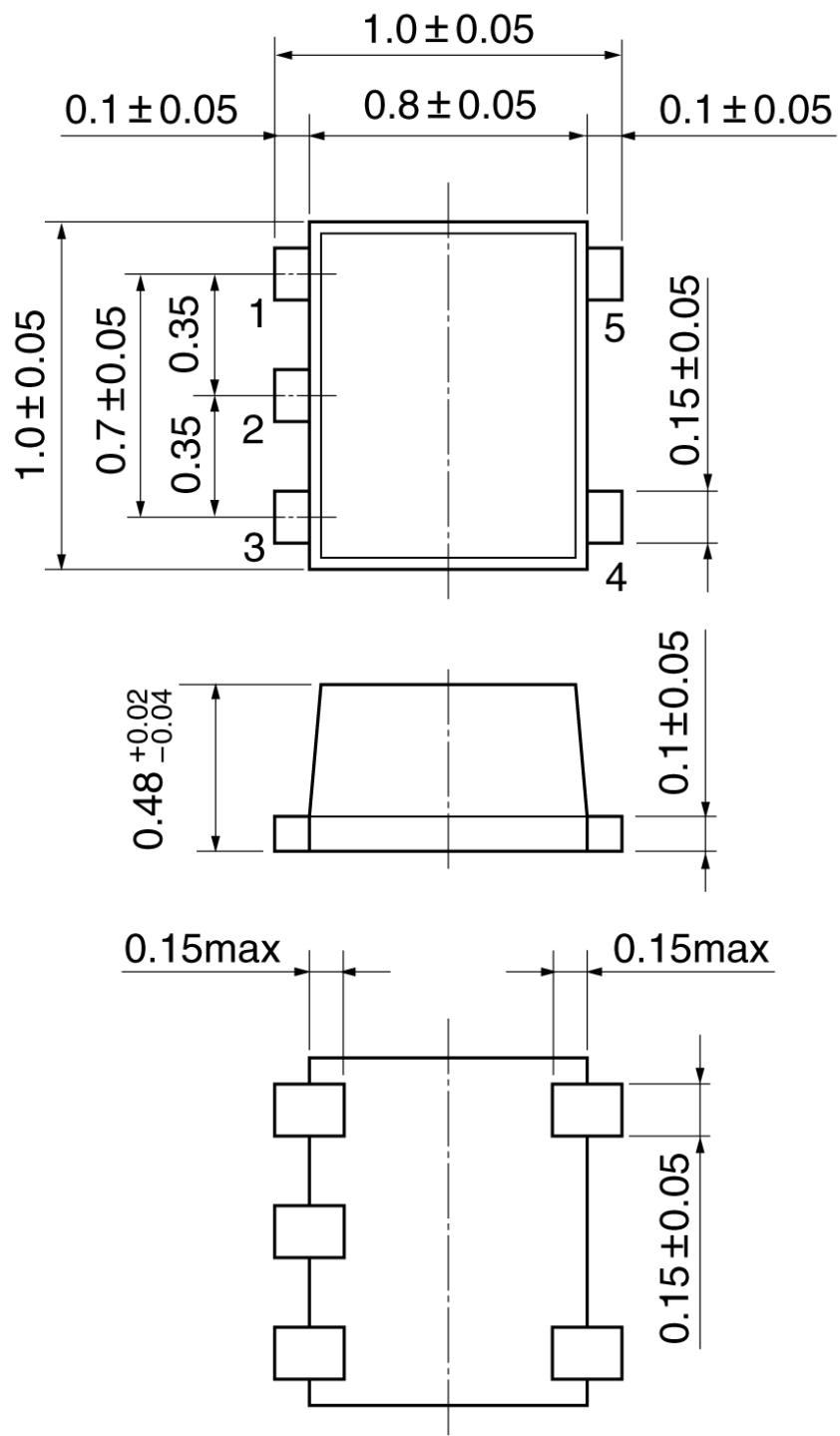
Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit
			V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	$t_{pLH}$ $t_{pHL}$	—	$3.3 \pm 0.3$	15	—	5.6	8.0	1.0	9.5	ns
				50	—	8.1	11.5	1.0	13.0	
			$5.0 \pm 0.5$	15	—	3.8	5.5	1.0	6.5	
				50	—	5.3	7.5	1.0	8.5	
3-state output enable time	$t_{pZL}$ $t_{pZH}$	—	$3.3 \pm 0.3$	15	—	5.4	8.0	1.0	9.5	ns
				50	—	7.9	11.5	1.0	13.0	
			$5.0 \pm 0.5$	15	—	3.6	5.1	1.0	6.0	
				50	—	5.1	7.1	1.0	8.0	
3-state output disable time	$t_{pLZ}$ $t_{pHZ}$	—	$3.3 \pm 0.3$	50	—	9.5	13.2	1.0	15.0	ns
			$5.0 \pm 0.5$	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)		—	14	—	—	—	pF

Note: 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



Weight: 0.001 g (typ.)

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