

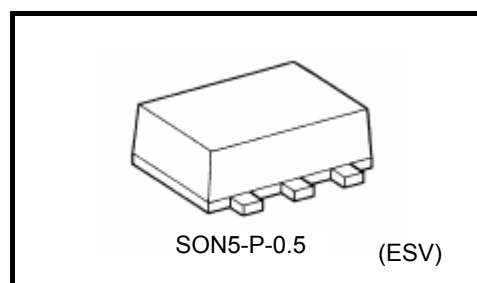
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7SZ125FE

Bus Buffer 3-State Output

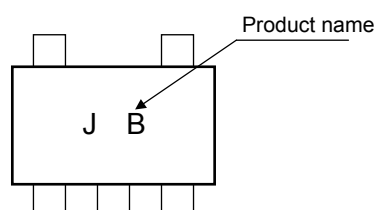
Features

- High output current : $\pm 24\text{mA}$ (min) at $V_{CC} = 3\text{V}$
- Super high speed operation : $t_{pd} = 2.6\text{ns}$ (typ.)
at $V_{CC} = 5\text{V}$, 50pF
- Operation voltage range : $V_{CC} = 1.65$ to 5.5V
- 5.5-V tolerant inputs
- 5.5-V power down protection output
- Matches the performance of TC74LCX series when operated at $3.3\text{V } V_{CC}$.



Weight: 0.003 g (typ.)

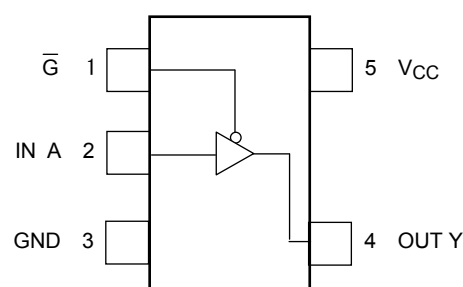
Marking



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

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5 to 6	V
DC input voltage	V_{IN}	-0.5 to 6	V
DC output voltage	V_{OUT}	-0.5 to 6 (Note 1)	V
		-0.5 to $V_{CC}+0.5$ (Note 2)	
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	-20 (Note 3)	mA
DC output current	I_{OUT}	± 50	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	150	mW
Storage temperature	T_{stg}	-65 to 150	$^\circ\text{C}$

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).

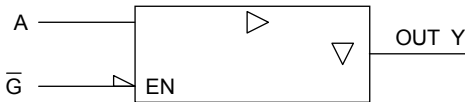
Note 1: $V_{CC} = 0\text{V}$ or high impedance condition

Note 2: High or Low state. Do not exceed I_{OUT} of absolute maximum ratings.

Note 3: $V_{OUT} < \text{GND}$

Start of commercial production
2008-10

IEC Logic Symbol



Truth Table

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

X: Don't Care
Z: High Impedance

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	1.65 to 5.5	V
		1.5 to 5.5 (Note 4)	
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to 5.5 (Note 5)	V
		0 to V_{CC} (Note 6)	
Operating temperature	T_{opr}	-40 to 85	°C
Input rise and fall time	dt/dv	0 to 20 ($V_{CC} = 1.80\text{ V} \pm 0.15\text{ V}$, $2.5\text{ V} \pm 0.2\text{ V}$)	ns/V
		0 to 10 ($V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$)	
		0 to 5 ($V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$)	

- Note 4: Data retention only
Note 5: $V_{CC} = 0\text{ V}$ or high impedance condition
Note 6: High or Low state

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition		Ta = 25°C			Ta = −40 to 85°C		Unit		
					V _{CC} (V)	Min	Typ.	Max	Min		Max	
Input voltage	High level	V _{IH}	—	1.65 to 1.95	V _{CC} × 0.75	—	—	V _{CC} × 0.75	—	V		
				2.3 to 5.5	V _{CC} × 0.7	—	—	V _{CC} × 0.7	—			
	Low level	V _{IL}	—	1.65 to 1.95	—	—	V _{CC} × 0.25	—	V _{CC} × 0.25			
				2.3 to 5.5	—	—	V _{CC} × 0.3	—	V _{CC} × 0.3			
Output voltage	High level	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = −100 μA	1.65	1.55	1.65	—	1.55	—	V	
					2.3	2.2	2.3	—	2.2	—		
					3.0	2.9	3.0	—	2.9	—		
					4.5	4.4	4.5	—	4.4	—		
				I _{OH} = −4 mA	1.65	1.29	1.52	—	1.29	—		
					I _{OH} = −8 mA	2.3	1.9	2.15	—	1.9		—
					I _{OH} = −16 mA	3.0	2.4	2.8	—	2.4		—
					I _{OH} = −24 mA	3.0	2.3	2.68	—	2.3		—
	I _{OH} = −32 mA	4.5	3.8	4.2	—	3.8	—					
	Low level	V _{OL}	V _{IN} = V _{IL}	I _{OL} = 100 μA	1.65	—	0	0.1	—	0.1		
					2.3	—	0	0.1	—	0.1		
					3.0	—	0	0.1	—	0.1		
					4.5	—	0	0.1	—	0.1		
				I _{OL} = 4 mA	1.65	—	0.08	0.24	—	0.24		
					I _{OL} = 8 mA	2.3	—	0.1	0.3	—		0.3
					I _{OL} = 16 mA	3.0	—	0.15	0.4	—		0.4
I _{OL} = 24 mA					3.0	—	0.22	0.55	—	0.55		
I _{OL} = 32 mA	4.5	—	0.22	0.55	—	0.55						
Input leakage current		I _{IN}	V _{IN} = 5.5 V or GND	0 to 5.5	—	—	±1	—	±10	μA		
3-state output off-state current		I _{OZ}	V _{IN} = V _{IH} or V _{IL} V _{OUT} = 0 to 5.5 V	1.65 to 5.5	—	—	±1	—	±10	μA		
Power off leakage current		I _{OFF}	V _{IN} or V _{OUT} = 5.5 V	0.0	—	—	1	—	10	μA		
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	2	—	20	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
			VCC (V)	Min	Typ.	Max	Min	Max	
Propagation delay time	tpLH tpHL	CL = 15 pF, RL = 1 MΩ (Figure 1)	1.8±0.15	2.0	5.3	11.0	2.0	11.5	ns
			2.5 ± 0.2	0.8	3.4	7.5	0.8	8.0	
			3.3 ± 0.3	0.5	2.5	5.2	0.5	5.5	
			5.0 ± 0.5	0.5	2.1	4.5	0.5	4.8	
		CL = 50 pF, RL = 500 Ω (Figure 1)	3.3 ± 0.3	1.5	3.2	5.7	1.5	6.0	
			5.0 ± 0.5	0.8	2.6	5.0	0.8	5.3	
Output enable time	tpZL tpZH	CL = 50 pF, RL = 500 Ω (Figure 1)	1.8±0.15	2.0	7.0	14.9	2.0	16.6	ns
			2.5 ± 0.2	1.5	4.6	8.5	1.5	9.0	
			3.3 ± 0.3	1.5	3.5	6.2	1.5	6.5	
			5.0 ± 0.5	0.8	2.8	5.5	0.8	5.8	
Output disable time	tpLZ tpHZ	CL = 50 pF, RL = 500 Ω (Figure 1)	1.8±0.15	2.0	5.4	11.8	2.0	12.7	ns
			2.5 ± 0.2	1.5	4.0	8.0	1.5	8.5	
			3.3 ± 0.3	1.0	3.5	5.7	1.0	6.0	
			5.0 ± 0.5	0.5	2.5	4.7	0.5	5.0	
Input capacitance	CIN	—	0 to 5.5	—	4	—	—	—	pF
Power dissipation capacitance	CPD	(Note 7)	3.3	—	17	—	—	—	pF
			5.5	—	24	—	—	—	

Note 7: 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:

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

AC Characteristics Measurement Circuit

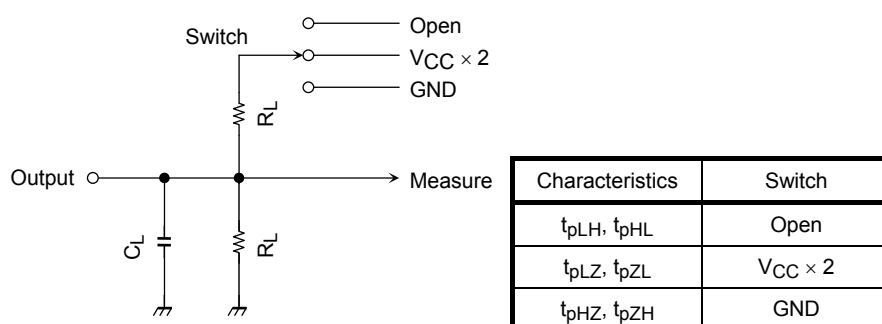
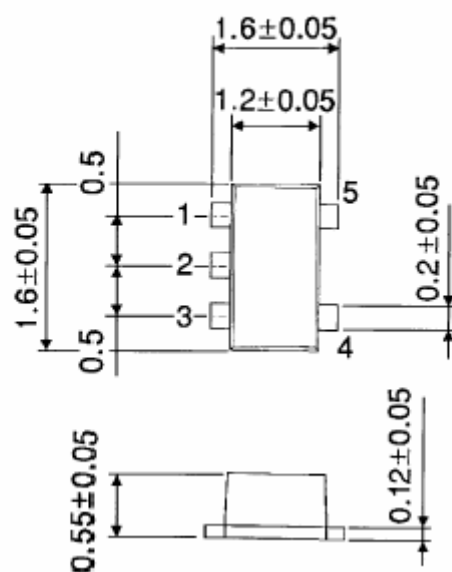


Figure 1

Package Dimensions

SON5-P-0.50

Unit : mm



Weight: 0.003 g (typ.)

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