

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC7SZ125F, TC7SZ125FU

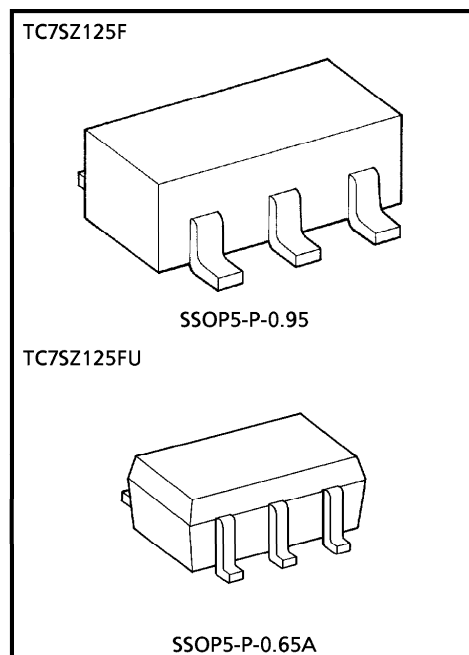
## BUS BUFFER 3-STATE OUTPUT

### FEATURES

- High Output Drive :  $\pm 24$  mA (Typ.)  
( $V_{CC} = 3$  V)
- Super High Speed Operation :  $t_{pD} = 2.6$  ns (Typ.)  
( $V_{CC} = 5$  V, 50 pF)
- Operation Voltage Range :  $V_{CC(opr)} = 1.8 \sim 5.5$  V
- Supply Voltage Data Retention :  $V_{CC} = 1.5 \sim 5.5$  V
- 5 V Tolerant Function
- Matches the Performance of TC74LCX Series when Operated at 3.3 V  $V_{CC}$

### MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~6	V
DC Input Voltage	$V_{IN}$	-0.5~6	V
DC Output Voltage	$V_{OUT}$	-0.5~6	V
Input Diode Current	$I_{IK}$	$\pm 20$	mA
Output Diode Current	$I_{OK}$	$\pm 20$	mA
DC Output Current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	$\pm 50$	mA
Power Dissipation	$P_D$	200	mW
Storage Temperature	$T_{stg}$	-65~150	°C
Lead Temperature (10 s)	$T_L$	260	°C



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

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**DC ELECTRICAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT		
				MIN.	TYP.	MAX.	MIN.	MAX.			
High-Level Input Voltage	V <sub>IH</sub>		1.8	0.88 × V <sub>CC</sub>	—	—	0.88 × V <sub>CC</sub>	—	V		
			2.3~ 5.5	0.75 × V <sub>CC</sub>	—	—	0.75 × V <sub>CC</sub>	—			
Low-Level Input Voltage	V <sub>IL</sub>		1.8	—	—	0.12 × V <sub>CC</sub>	—	0.12 × V <sub>CC</sub>	V		
			2.3~ 5.5	—	—	0.25 × V <sub>CC</sub>	—	0.25 × V <sub>CC</sub>			
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OH</sub> = -100 μA	1.8	1.7	1.8	—	1.7	—	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 <sub>OH</sub> = -8 mA	2.3	1.9	2.15	—	1.9		—
				I <sub>OH</sub> = -16 mA	3.0	2.4	2.8	—	2.4		—
				I <sub>OH</sub> = -24 mA	3.0	2.3	2.68	—	2.3		—
I <sub>OH</sub> = -32 mA	4.5	3.8	4.2	—	3.8	—					
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 100 μA	1.8	—	0	0.1	—	0.1	V	
				2.3	—	0	0.1	—	0.1		
				3.0	—	0	0.1	—	0.1		
				4.5	—	0	0.1	—	0.1		
				I <sub>OL</sub> = 8 mA	2.3	—	0.1	0.3	—		0.3
				I <sub>OL</sub> = 16 mA	3.0	—	0.15	0.4	—		0.4
				I <sub>OL</sub> = 24 mA	3.0	—	0.22	0.55	—		0.55
I <sub>OL</sub> = 32 mA	4.5	—	0.22	0.55	—	0.55					
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5 V or GND	0~ 5.5	—	—	±1	—	±10	μA		
Power Off Leakage Current	I <sub>OFF</sub>	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V	0.0	—	—	1	—	10	μA		
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	2	—	20	μA		

**AC ELECTRICAL CHARACTERISTICS (Input  $t_r = t_f = 3$  ns)**

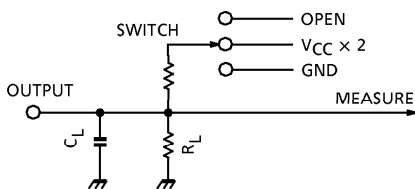
CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta = 25°C						Ta = -40~85°C		UNIT
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.	MAX.			
Propagation Delay Time	t <sub>PLH</sub> t <sub>PHL</sub>	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 1 MΩ (Figure 1)	1.8	2.0	5.3	11.0	2.0	11.5	ns		
			2.5 ± 0.2	0.8	3.4	7.5	0.8	8.0			
			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			
		C <sub>L</sub> = 50 pF, R <sub>L</sub> = 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	t <sub>PZL</sub> t <sub>PZH</sub>	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω (Figure 1)	1.8	2.0	7.0	12.5	2.0	13.0	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	t <sub>PLZ</sub> t <sub>PHZ</sub>	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω (Figure 1)	1.8	2.0	5.4	11.0	2.0	12.0	ns		
			2.5 ± 0.2	1.5	3.5	8.0	1.5	8.5			
			3.3 ± 0.3	1.0	2.8	5.7	1.0	6.0			
			5.0 ± 0.5	0.5	2.1	4.7	0.5	5.0			
Input Capacitance	C <sub>IN</sub>		0~5.5	—	4	—	—	—	pF		
Power Dissipation Capacitance	C <sub>PD</sub>	(Note 1)	3.3	—	17	—	—	—	pF		
			5.5	—	24	—	—	—			

(Note 1) 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.

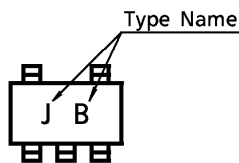
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Figure 1 AC Characteristics Measurement Circuit

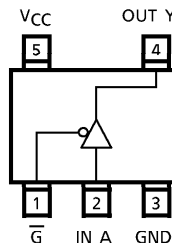


CHARACTERISTICS	SWITCH
t <sub>PLH</sub> , t <sub>PHL</sub>	OPEN
t <sub>PLZ</sub> , t <sub>PZL</sub>	V <sub>CC</sub> × 2
t <sub>PHZ</sub> , t <sub>PZH</sub>	GND

**MARKING**



**PIN ASSIGNMENT (TOP VIEW)**

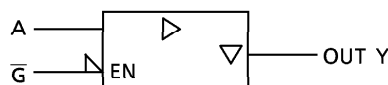


**TRUTH TABLE**

INPUT		OUTPUT
A	$\bar{G}$	Y
x	H	Z
L	L	L
H	L	H

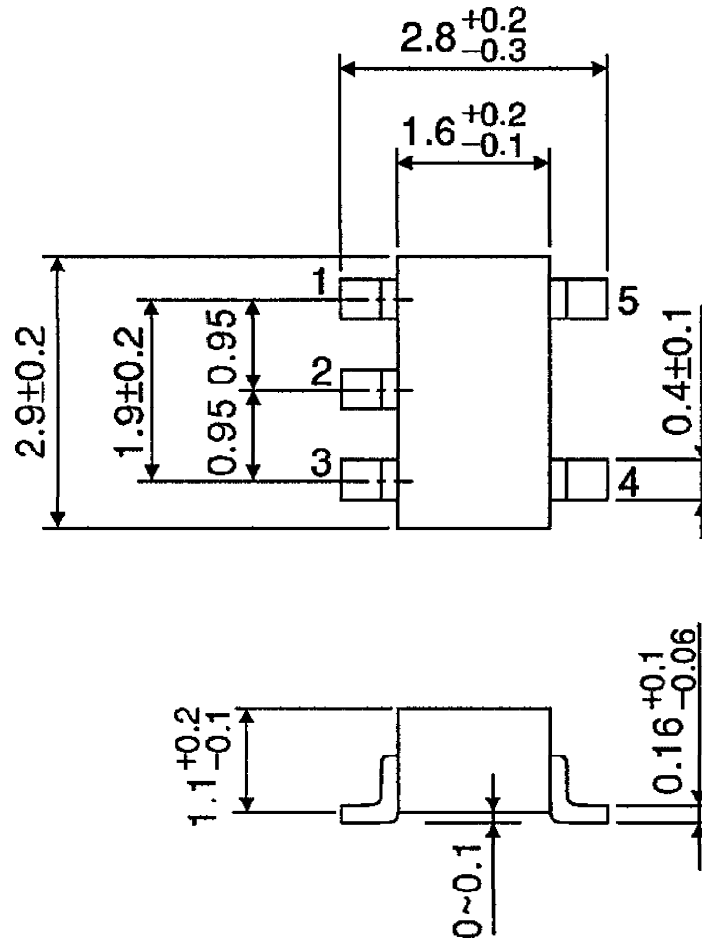
x : Don't Care  
Z : High Impedance

**LOGIC DIAGRAM**



OUTLINE DRAWING  
SSOP5-P-0.95

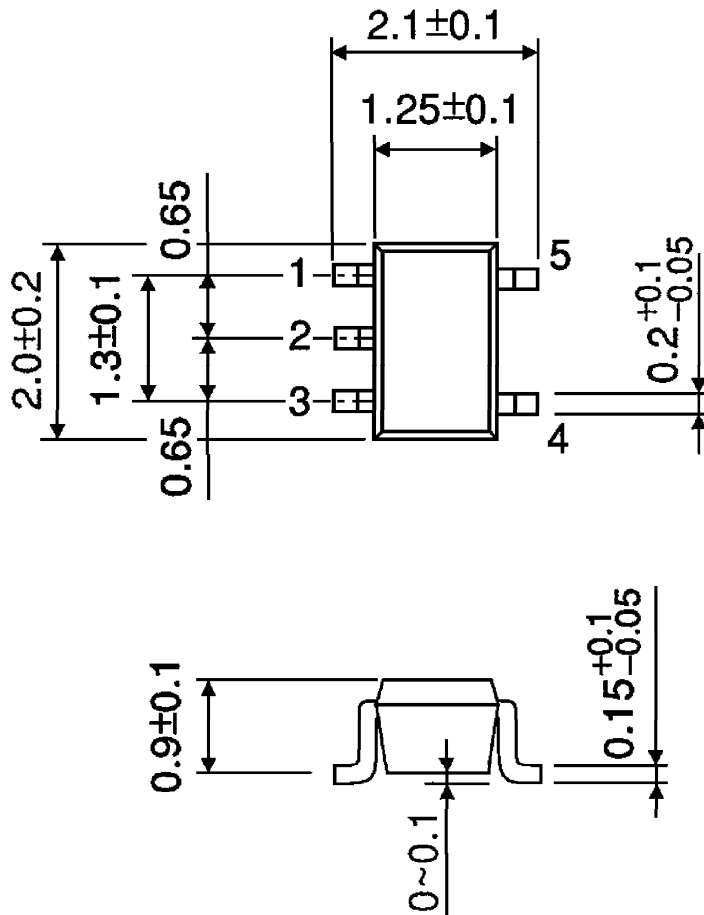
Unit : mm



Weight : 0.016 g (Typ.)

OUTLINE DRAWING  
SSOP5-P-0.65A

Unit : mm



Weight : 0.006 g (Typ.)