

Preliminary

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

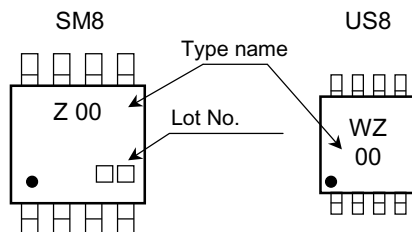
TC7WZ00FU, TC7WZ00FK

2 Input Nand Gate

Features

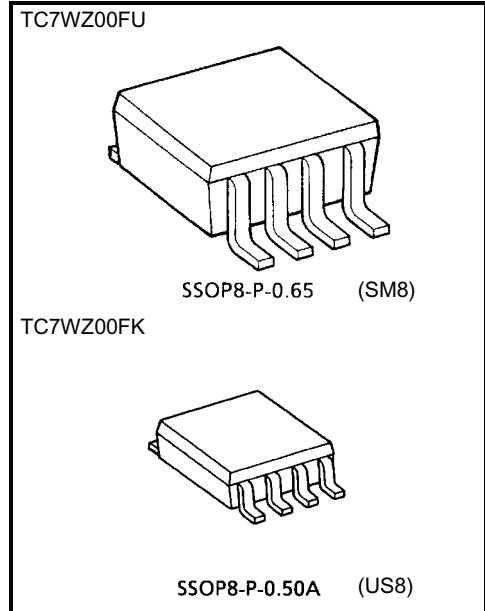
- High output drive: ± 24 mA (min) @ $V_{CC} = 3$ V
- Super high speed operation: t_{pd} 2.4 ns (typ.) @ $V_{CC} = 5$ V, 50 pF
- Operation voltage range: $V_{CC} (opr) = 1.65 \sim 5.5$ V
- Latch-up performance: ± 500 mA or more
- ESD performance: ± 200 V or more (EIAJ)
 ± 2000 V or more (MIL)
- Power down protection is provided on all inputs and outputs.
- Matches the performance of TC74LCX series when operated at 3.3 V V_{CC} .

Marking



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Power supply voltage	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}	-20	mA
Output diode current	I_{OK}	-20	mA
DC output current	I_{OUT}	± 50	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	300 (SM8) 200 (US8)	mW
Storage temperature	T_{stg}	-65~150	°C
Lead temperature (10s)	T_L	260	°C

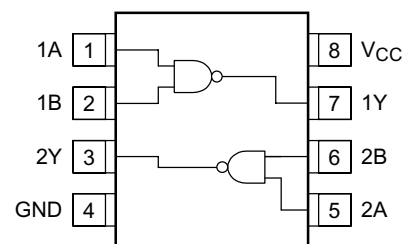


Weight

SSOP8-P-0.65 : 0.02 g (typ.)

SSOP8-P-0.50A : 0.01 g (typ.)

Pin Assignment (top view)



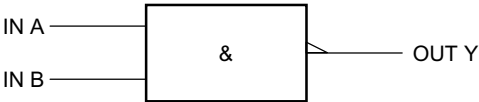
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Truth Table

A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

Logic Diagram



Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	1.65~5.5	V
		1.5~5.5 (Note 1)	
Input voltage	V _{IN}	0~5.5	V
Output voltage	V _{OUT}	0~5.5 (Note 2)	V
		0~V _{CC} (Note 3)	
Operating temperature	T _{opr}	−40~85	°C
Input rise and fall time	d _t /d _v	0~20 (V _{CC} = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V)	ns/V
		0~10 (V _{CC} = 3.3 V ± 0.3 V)	
		0~5 (V _{CC} = 5.5 V ± 0.5 V)	

- Note 1: Data retention only
- Note 2: V_{CC} = 0 V
- Note 3: High or low state

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• The information contained herein is subject to change without notice.

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition		Ta = 25°C				Ta = -40~85°C		Unit					
					V _{CC} (V)	Min	Typ.	Max	Min	Max						
Input voltage	High level	V _{IH}	—	1.65~1.95	0.75 × V _{CC}	—	—	0.75 × V _{CC}	—	V						
				2.3~5.5	0.7 × V _{CC}	—	—	0.7 × V _{CC}	—							
	Low level	V _{IL}	—	1.65~1.95	—	—	0.25 × V _{CC}	—	0.25 × V _{CC}							
				2.3~5.5	—	—	0.3 × V _{CC}	—	0.3 × V _{CC}							
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 _{IH}	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		0~5.5	—		—	±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} = 5.5 V or GND		1.65~5.5	—		—	1	—	10	μA

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

Characteristics	Symbol	Test Condition	Ta = 25°C				Ta = -40~85°C		Unit
			V _{CC} (V)	Min	Typ.	Max	Min	Max	
Propagation delay time	t _{pLH} t _{pHL}	C _L = 15 pF, R _L = 1 MΩ	1.8 ± 0.15	2.0	5.3	9.6	2.0	9.8	ns
			2.5 ± 0.2	1.2	3.2	5.3	1.2	5.7	
			3.3 ± 0.3	0.8	2.4	3.7	0.8	4.0	
			5.0 ± 0.5	0.5	1.9	2.9	0.5	3.2	
		C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.2	3.0	4.6	1.2	4.9	
			5.0 ± 0.5	0.8	2.4	3.6	0.8	3.9	
Input capacitance	C _{IN}	—	0~5.5	—	3.0	—	—	—	pF
Power dissipation capacitance	C _{PD}	(Note)	3.3	—	22	—	—	—	pF
			5.5	—	32	—	—	—	

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

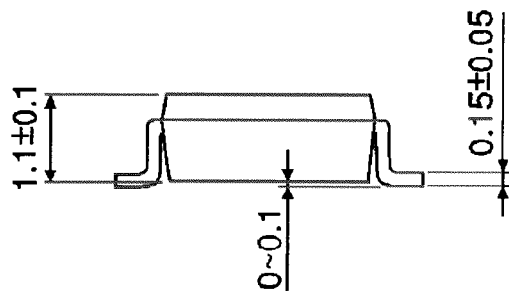
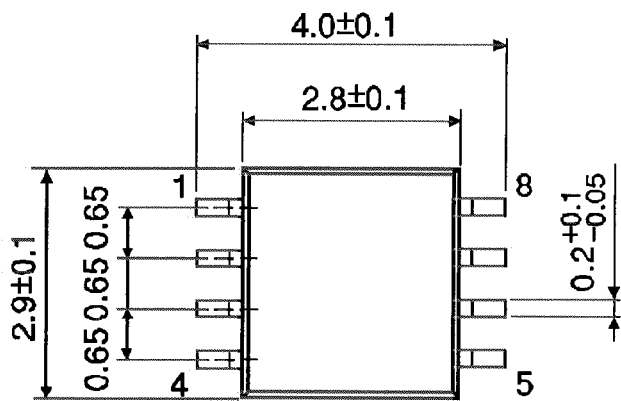
Average operating current can be obtained by the equation:

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$$

Package Dimensions

SSOP8-P-0.65

Unit : mm

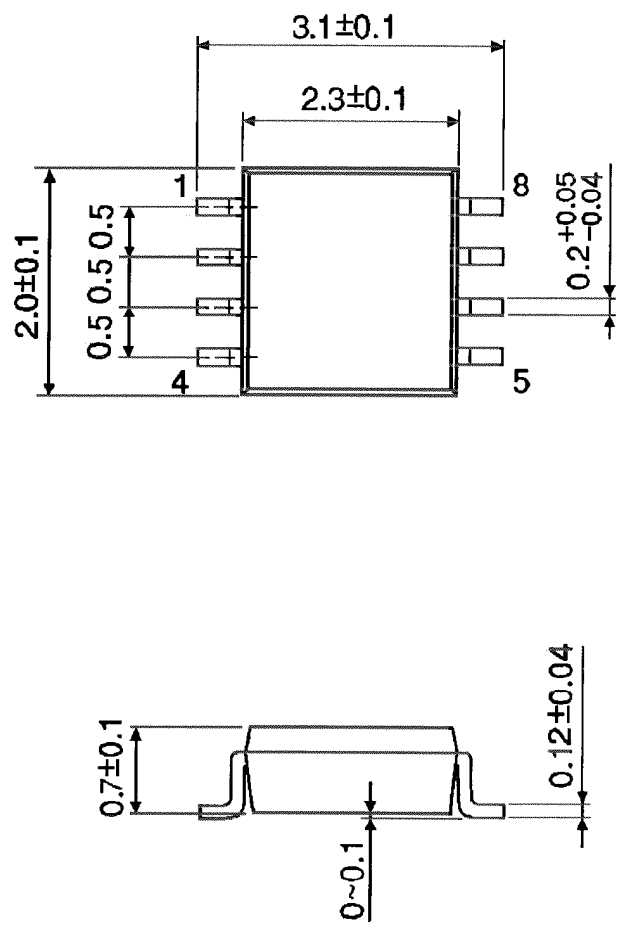


Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)