

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

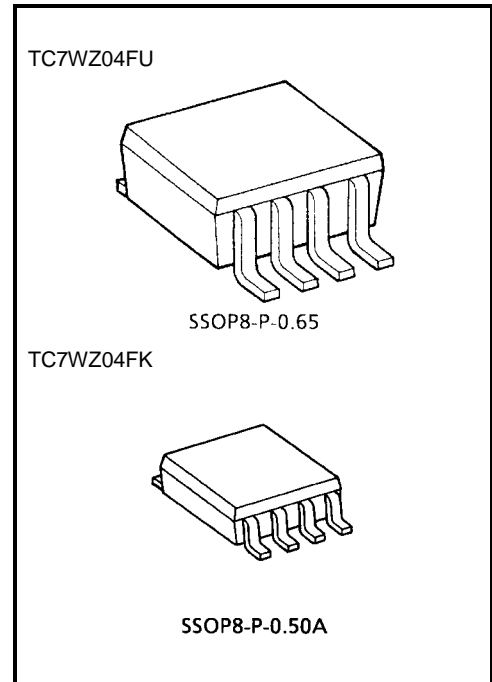
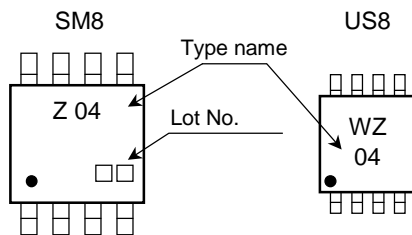
TC7WZ04FU, TC7WZ04FK

Triple Inverter

Features

- High output drive: ± 24 mA (min) @ $V_{CC} = 3$ V
- Super high speed operation: t_{pd} 2.3 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 (JEITA)
 ± 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

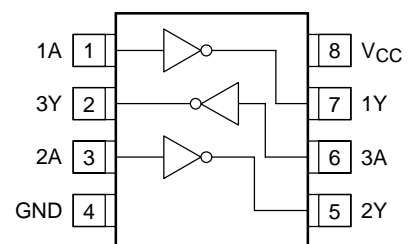


Weight
 SSOP8-P-0.65 : 0.02 g (typ.)
 SSOP8-P-0.50A : 0.01 g (typ.)

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

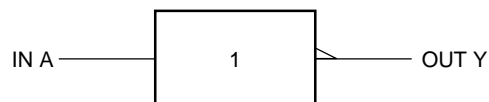
Pin Assignment (top view)



Truth Table

A	Y
L	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 ($V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$, 2.5 $\text{V} \pm 0.2\text{ V}$)	ns/V
		0~10 ($V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$)	
		0~5 ($V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$)	

Note 1: Data retention only

Note 2: $V_{CC} = 0\text{ V}$

Note 3: High or low state

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 _{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
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: $t_r = t_f = 3$ 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}	C _L = 15 pF, R _L = 1 MΩ	1.8 ± 0.15	1.8	4.4	9.5	2.0	10.0	ns
			2.5 ± 0.2	1.2	3.0	5.1	1.2	5.6	
			3.3 ± 0.3	0.8	2.2	3.4	0.8	3.8	
			5.0 ± 0.5	0.5	1.8	2.8	0.5	3.1	
	t _{pHL}	C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.2	2.9	4.5	1.2	5.0	
			5.0 ± 0.5	0.8	2.3	3.6	0.8	4.0	
Input capacitance	C _{IN}	—	0~5.5	—	3.0	—	—	—	pF
Power dissipation capacitance	C _{PD}	(Note)	3.3	—	18	—	—	—	pF
			5.5	—	23	—	—	—	

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

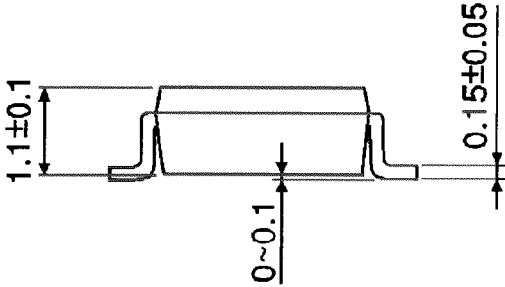
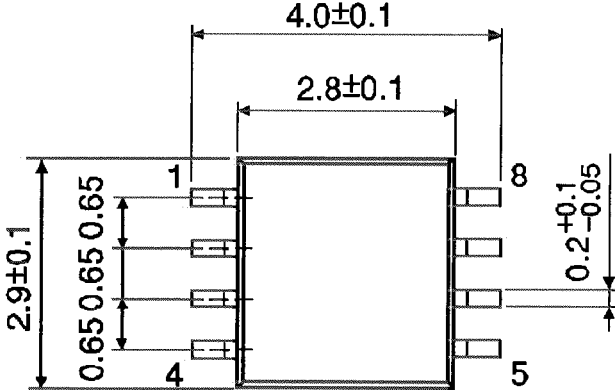
Average operating current can be obtained by the equation:

$$I_{CC (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/3$$

Package Dimensions

SSOP8-P-0.65

Unit : mm

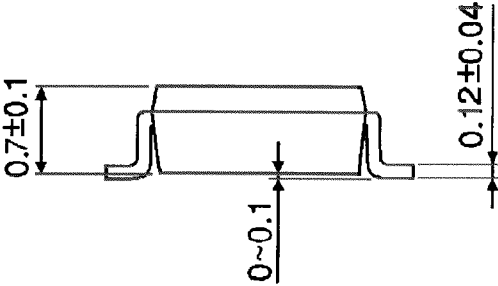
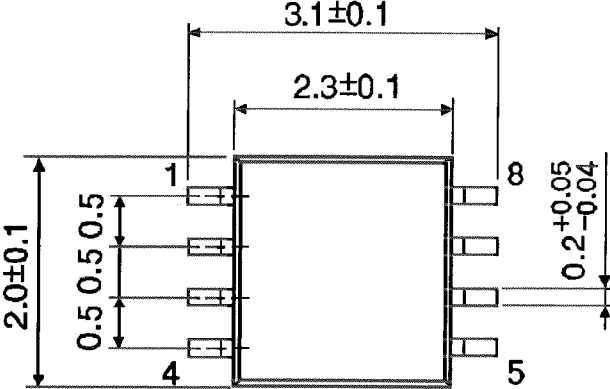


Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)

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