

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

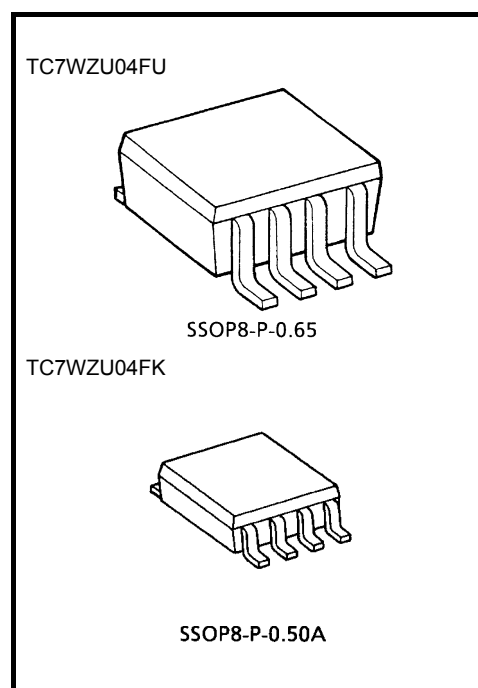
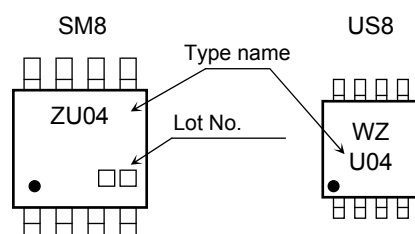
TC7WZU04FU, TC7WZU04FK

Triple Inverter (Un-Buffer)

Features

- High output drive: ± 16 mA (min) at $V_{CC} = 4.5$ V
- Low quiescent power: $I_{CC} < 1\mu\text{A}$ (max.)
at $V_{CC} = 5.5$ V, $T_a = 25^\circ\text{C}$
- Operation voltage range: $V_{CC}(\text{opr}) = 1.65 \sim 5.5$ V
- 5.5-V tolerant inputs

Marking

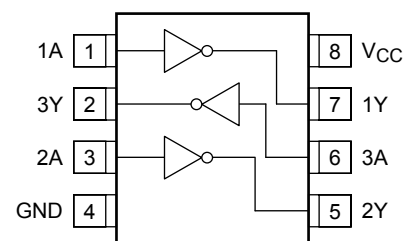


Weight
 SSOP8-P-0.65 : 0.02 g (typ.)
 SSOP8-P-0.50A : 0.01 g (typ.)

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

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	$-0.5 \sim 6$	V
DC input voltage	V_{IN}	$-0.5 \sim 6$	V
DC output voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5V$	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}	$-65 \sim 150$	$^\circ\text{C}$
Lead temperature (10s)	T_L	260	$^\circ\text{C}$

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).

Truth Table

A	Y
L	H
H	L

Logic Diagram



Operating Ranges

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~V _{CC}	V
Operating temperature	T _{opr}	-40~85	°C

Note 1: Data retention only

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}	—		1.65~2.7	0.85 × V _{CC}	—	—	0.85 × V _{CC}	—	V	
					3.0~5.5	0.8 × V _{CC}	—	—	0.8 × V _{CC}	—		
	Low level	V _{IL}	—		1.65~2.7	—	—	0.15 × V _{CC}	—	0.15 × V _{CC}		
					3.0~5.5	—	—	0.2 × V _{CC}	—	0.2 × V _{CC}		
Output voltage	High level	V _{OH}	V _{IN} = V _{IL}	I _{OH} = -100 μA	1.65	1.45	1.64	—	1.45	—	V	
					2.3	2.1	2.29	—	2.1	—		
					3.0	2.7	2.99	—	2.7	—		
					4.5	4.0	4.48	—	4.0	—		
			V _{IN} =GND	I _{OH} = -2 mA	1.65	1.29	1.52	—	1.29	—		
					I _{OH} = -4 mA	2.3	1.9	2.19	—	1.9		—
					I _{OH} = -8 mA	3.0	2.4	2.82	—	2.4		—
					I _{OH} = -12 mA	3.0	2.3	2.73	—	2.3		—
					I _{OH} = -16 mA	4.5	3.8	4.24	—	3.8		—
					V _{IN} = V _{IH}	I _{OL} = 100 μA	1.65	—	0.01	0.2		—
	2.3	—	0.01	0.2			—	0.2				
	3.0	—	0.01	0.3			—	0.3				
	4.5	—	0.01	0.5			—	0.5				
	Low level	V _{OL}	V _{IN} =V _{CC}	I _{OL} = 2 mA	1.65	—	0.08	0.24	—	0.24		
					I _{OL} = 4 mA	2.3	—	0.12	0.3	—		0.3
					I _{OL} = 8 mA	3.0	—	0.19	0.4	—		0.4
					I _{OL} = 12 mA	3.0	—	0.29	0.55	—		0.55
					I _{OL} = 16 mA	4.5	—	0.29	0.55	—		0.55
Input leakage current					I _{IN}	V _{IN} = 5.5 V or GND		0~5.5	—	—	±1	—
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	1.5	4.6	8.1	1.5	8.9
			2.5 ± 0.2	1.2	3.3	5.7	1.2	6.3
			3.3 ± 0.3	0.8	2.7	4.1	0.8	4.5
			5.0 ± 0.5	0.5	2.2	3.3	0.5	3.6
	t _{pHL}	C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.2	4.0	6.4	1.2	7.0
			5.0 ± 0.5	0.8	3.4	5.6	0.8	6.2
Input capacitance	C _{IN}	—	0~5.5	—	5.4	—	—	—
Power dissipation capacitance	C _{PD}	(Note 2)	3.3	—	9.8	—	—	—
			5.5	—	22	—	—	—

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

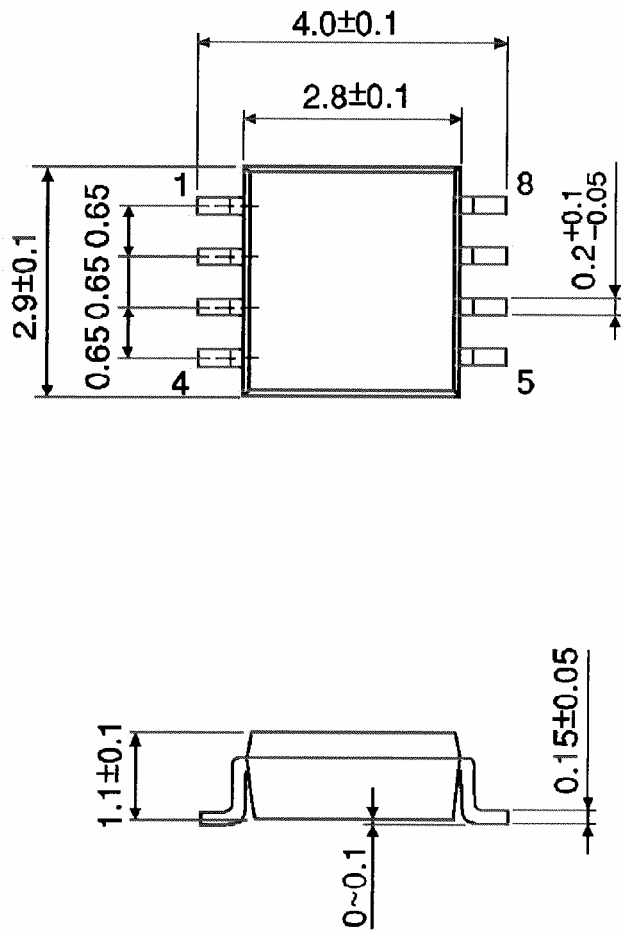
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP8-P-0.65

Unit : mm

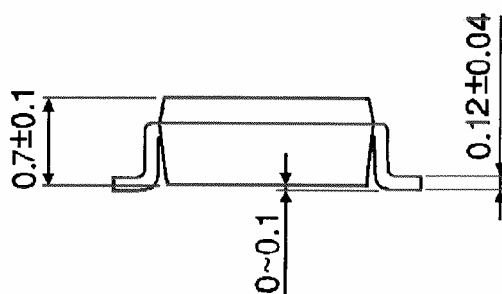
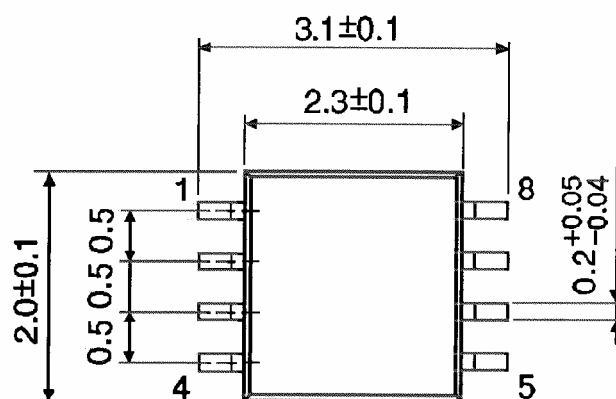


Weight: 0.02 g (typ.)

Package Dimensions

SSOP8-P-0.50A

Unit : mm



Weight: 0.01 g (typ.)

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20070701-EN GENERAL

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