TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

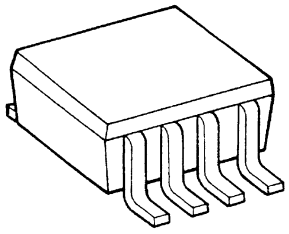
TC7WZU04FU,TC7WZU04FK

Triple Inverter (Un-Buffer)

Features

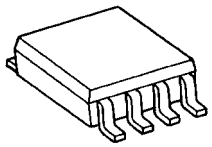
- High output drive: ±16 mA (min) at V_{CC} = 4.5 V
- Low quiescent power: I_{CC} < 1μA (max.)
  at V_{CC} = 5.5 V, Ta=25°C
- Operation voltage range: $V_{CC\ (opr)}$ = 1.65~5.5 V
- 5.5-V tolerant inputs

TC7WZU04FU



SSOP8-P-0.65

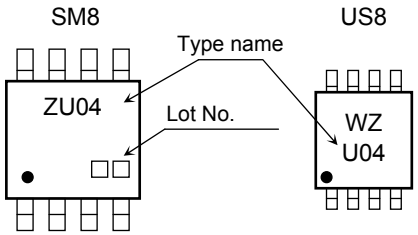
TC7WZU04FK



SSOP8-P-0.50A

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

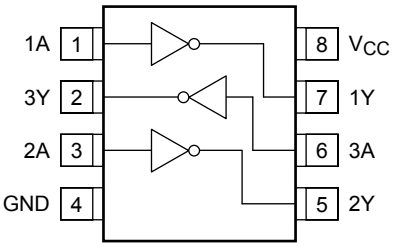
Marking



Absolute 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~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}	−65~150	°C
Lead temperature (10s)	T_L	260	°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		V_{CC} (V)	Ta = 25°C			Ta = −40~85°C		Unit
						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	—	
	Low level	V_{OL}	V_{IN} = V_{IH}	I_{OL} = 100 μA	1.65	—	0.01	0.2	—	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	
			V_{IN}=VCC	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	—	±10	μA
Quiescent supply current		I_{CC}	V_{IN} = 5.5 V or GND		1.65~5.5	—	—	1	—	10	μA

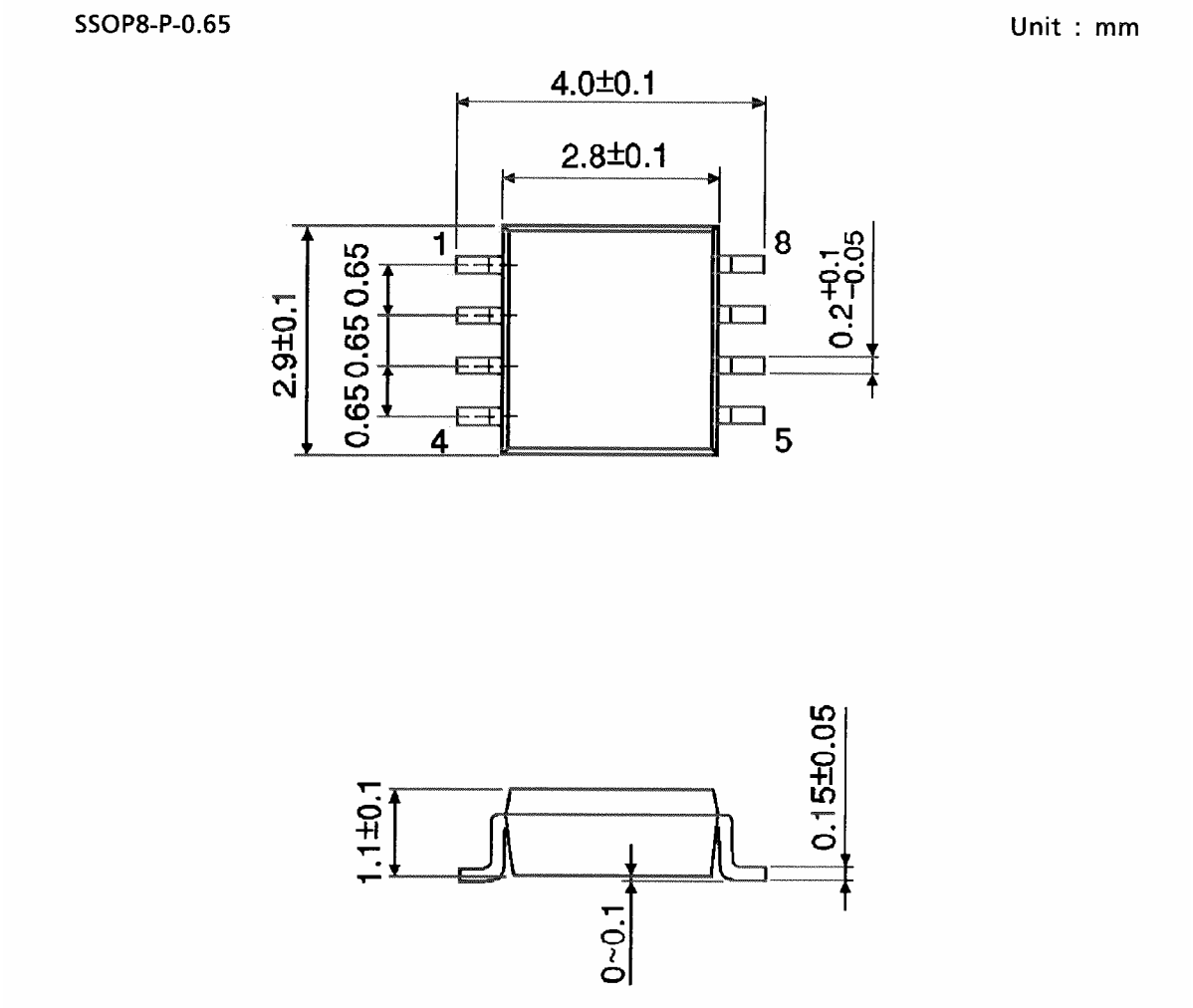
AC Characteristics (unless otherwise specified, Input: $t_r = t_f = 3$ ns)

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	1.5	4.6	8.1	1.5	8.9	ns
			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	—	—	—	pF
Power dissipation capacitance	C_{PD}	(Note 2)	3.3	—	9.8	—	—	—	pF
			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

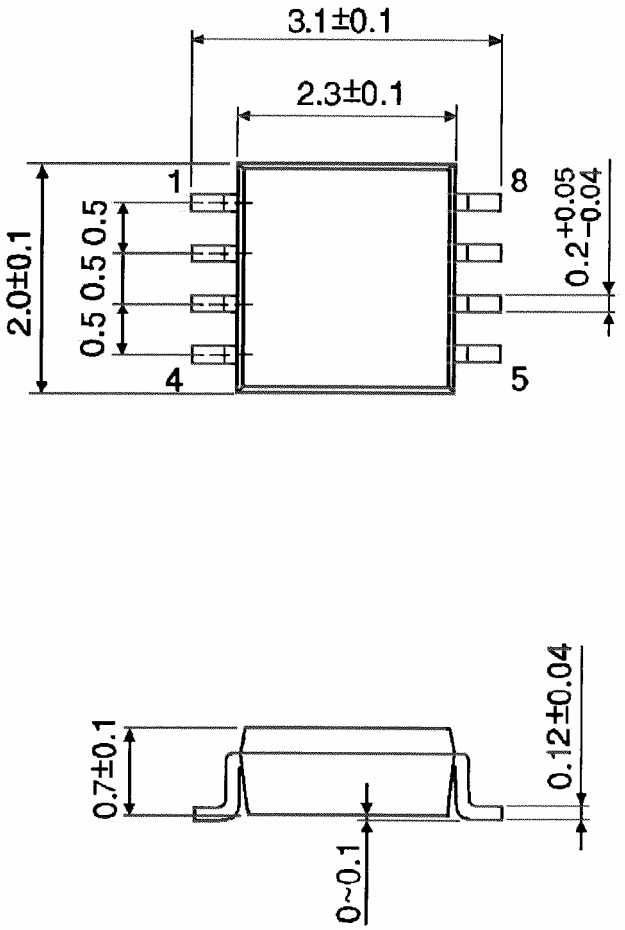
SSOP8-P-0.65 Unit : mm



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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