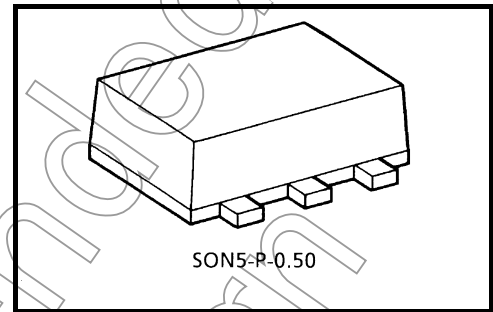


TC7SZU04AFE

Inverter

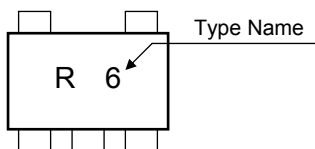
Features

- High output drive: ± 16 mA (min.) @ $V_{CC} = 4.5$ V
- Low quiescent power: $I_{CC} < 2$ μ A (max)
@ $V_{CC} = 5.5$ V, $T_a = 25^\circ\text{C}$
 - Operation voltage range: $V_{CC} = 1.8\sim 5.5$ V
 - Supply voltage data retention: $V_{CC} = 1.5\sim 5.5$ V
 - Latch-up performance: ± 500 mA or higher
 - ESD performance: Human body model $> \pm 2000$ V
Machine model $> \pm 200$ V
 - Power down protection is provided on all inputs.

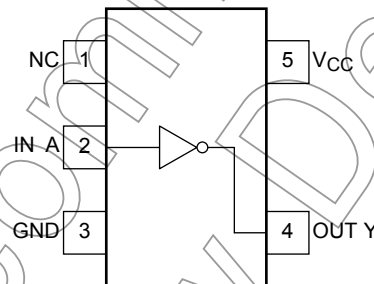


Weight: 0.003 g (typ.)

Marking



Pin Assignment (top view)



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

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

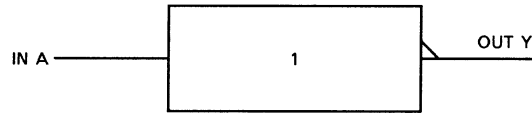
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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}	1.8~5.5	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 Circuit	Test Condition	T _a = 25°C			T _a = -40~85°C		Unit		
				V _{CC} (V)	Min	Typ.	Max	Min		Max	
High-level input voltage	V _{IH}	—		1.8	0.85 × V _{CC}	—	—	0.85 × V _{CC}	—	V	
				2.3~5.5	0.8 × V _{CC}	—	—	0.8 × V _{CC}	—		
Low-level input voltage	V _{IL}	—		1.8	—	—	0.15 × V _{CC}	—	0.15 × V _{CC}	V	
				2.3~5.5	—	—	0.2 × V _{CC}	—	0.2 × V _{CC}		
High-level output voltage	V _{OH}	—	V _{IN} = V _{IL} I _{OH} = -100 μA	1.8	1.6	1.8	—	1.6	—	V	
				2.3	2.1	2.3	—	2.1	—		
			3.0	2.7	3.0	—	2.7	—			
			4.5	4.0	4.4	—	4.0	—			
			V _{IN} = GND	I _{OH} = -4 mA	2.3	1.9	2.14	—	1.9		—
				I _{OH} = -8 mA	3.0	2.4	2.75	—	2.4		—
V _{IN} = GND	I _{OH} = -12 mA	3.0	2.3	2.61	—	2.3	—				
	I _{OH} = -16 mA	4.5	3.8	4.13	—	3.8	—				
Low-level output voltage	V _{OL}	—	V _{IN} = V _{IH} I _{OL} = 100 μA	1.8	—	0	0.2	—	0.2	V	
				2.3	—	0	0.2	—	0.2		
				3.0	—	0	0.3	—	0.3		
				4.5	—	0	0.5	—	0.5		
			V _{IN} = V _{CC}	I _{OL} = 4 mA	2.3	—	0.1	0.3	—		0.3
				I _{OL} = 8 mA	3.0	—	0.17	0.4	—		0.4
				I _{OL} = 12 mA	3.0	—	0.25	0.55	—		0.55
				I _{OL} = 16 mA	4.5	—	0.26	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} = V _{CC} or GND	5.5	—	—	2	—	20	μA	

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

Characteristics	Symbol	Test Circuit	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	1.0	—	8.5	1.0	9.0	ns
				2.5 ± 0.2	0.8	—	6.2	0.8	6.5	
	3.3 ± 0.3			0.5	—	4.5	0.5	4.8		
	5.0 ± 0.5			0.5	—	3.9	0.5	4.1		
	t _{PHL}		C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.0	—	6.0	1.0	6.5	
				5.0 ± 0.5	0.8	—	5.0	0.8	5.5	
Input capacitance	C _{IN}	—	—	0~5.5	—	5	—	—	pF	
Power dissipation capacitance	C _{PD}	—	(Note)	3.3	—	9	—	—	—	pF
				5.5	—	25	—	—	—	

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.

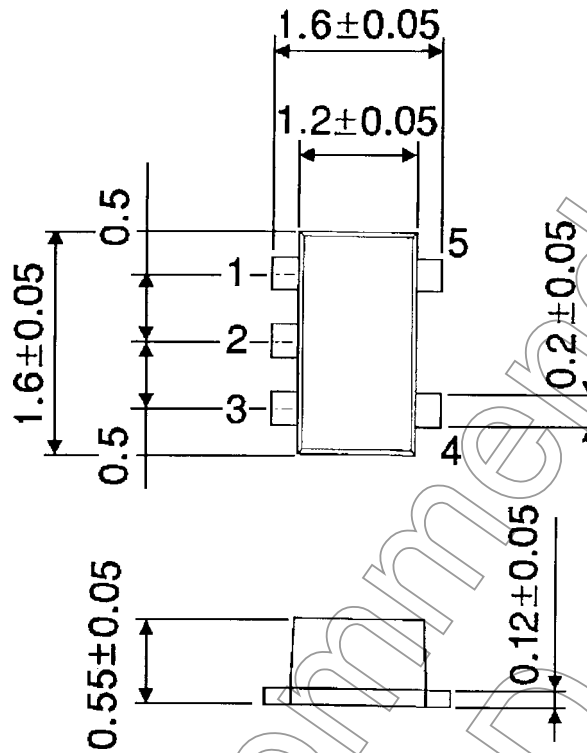
$$I_{CC (opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Not Recommended for New Design

Package Dimensions

SON5-P-0.50

Unit : mm



Weight: 0.003 g (typ.)

Not Recommended for New Design

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