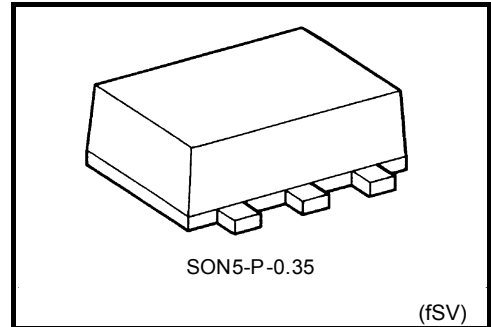


TC7SZ14AFS

Schmitt Inverter

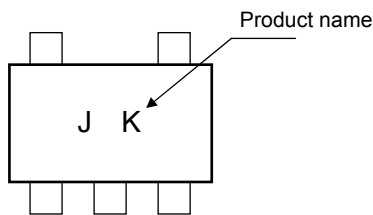
Features

- High output current : $\pm 24\text{mA}$ (min) at $V_{CC} = 3.0\text{V}$
- Super high speed operation : $t_{pd} = 3.7\text{ ns}$ (typ.)
at $V_{CC} = 5\text{V}$, $C_L = 50\text{pF}$
- Operating voltage range : $V_{CC(\text{opr})} = 1.65\text{ to }5.5\text{V}$
- 5.5-V tolerant input
- ESD performance : Machine model $\geq \pm 200\text{ V}$
Human body model $\geq \pm 2000\text{ V}$

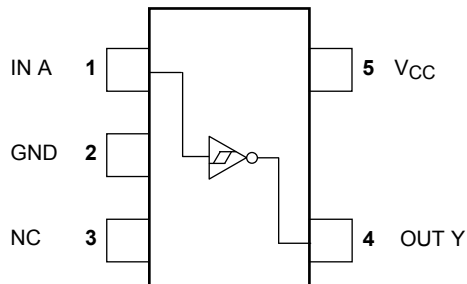


Weight : 0.001 g (typ.)

Marking



Pin Assignment (top view)



Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5 to 6	V
DC input voltage	V_{IN}	-0.5 to 6	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5\text{V}$	V
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20 (Note1)	mA
DC output current	I_{OUT}	± 50	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	50	mW
Storage temperature	T_{stg}	-65 to 150	°C

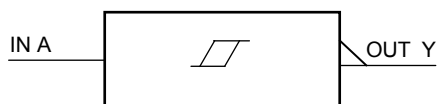
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

Note 1: $V_{OUT} < \text{GND}, V_{OUT} > V_{CC}$

Start of commercial production
2008-09

IEC Logic Symbol



Truth Table

A	Y
L	H
H	L

Operating Ranges

Characteristic	Symbol	Rating	Unit
Supply voltage	V _{CC}	1.65 to 5.5	V
		1.5 to 5.5 (Note 2)	
Input voltage	V _{IN}	0 to 5.5	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{opr}	-40 to 85	°C

Note 2: Data retention only

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit		
				V _{CC} (V)	Min	Typ.	Max	Min		Max	
Threshold voltage	Positive threshold voltage	V _P	—	1.65	0.6	1.0	1.4	0.6	1.4	V	
				1.8	0.7	1.1	1.5	0.7	1.5		
				2.3	1.0	1.4	1.8	1.0	1.8		
				3.0	1.3	1.75	2.2	1.3	2.2		
				4.5	1.9	2.45	3.1	1.9	3.1		
	Negative threshold voltage	V _N	—	1.65	0.2	0.5	0.8	0.2	0.8		
				1.8	0.25	0.55	0.9	0.25	0.9		
				2.3	0.4	0.75	1.15	0.4	1.15		
				3.0	0.6	1.0	1.5	0.6	1.5		
				4.5	1.0	1.43	2.0	1.0	2.0		
Hysteresis voltage	V _H	—	1.65	0.1	0.48	0.9	0.1	1.0	V		
			1.8	0.15	0.54	1.0	0.15	1.0			
			2.3	0.25	0.65	1.1	0.25	1.1			
			3.0	0.4	0.77	1.2	0.4	1.2			
			4.5	0.6	1.01	1.5	0.6	1.5			
Output voltage	High level	V _{OH}	V _{IN} = V _N	I _{OH} = -100 μA	1.65	1.55	1.65	—	1.55	V	
					1.8	1.7	1.8	—	1.7		
					2.3	2.2	2.3	—	2.2		
					3.0	2.9	3.0	—	2.9		
				I _{OH} = -4 mA	4.5	4.4	4.5	—	4.4		
					1.65	1.29	1.52	—	1.29		
					2.3	1.9	2.15	—	1.9		
					3.0	2.4	2.8	—	2.4		
	I _{OH} = -8 mA	4.5	3.8	4.2	—	3.8					
		3.0	2.3	2.68	—	2.3					
	Low level	V _{OL}	V _{IN} = V _P	I _{OL} = 100 μA	1.65	—	0	0.1	—		0.1
					1.8	—	0	0.1	—		0.1
					2.3	—	0	0.1	—		0.1
					3.0	—	0	0.1	—		0.1
				I _{OL} = 4 mA	4.5	—	0	0.1	—		0.1
					1.65	—	0.08	0.24	—		0.24
2.3					—	0.1	0.3	—	0.3		
3.0					—	0.15	0.4	—	0.4		
I _{OL} = 8 mA	4.5	—	0.22	0.55	—	0.55					
	3.0	—	0.22	0.55	—	0.55					
I _{OL} = 16 mA	4.5	—	0.22	0.55	—	0.55					
	3.0	—	0.22	0.55	—	0.55					
I _{OL} = 24 mA	4.5	—	0.22	0.55	—	0.55					
	3.0	—	0.22	0.55	—	0.55					
I _{OL} = 32 mA	4.5	—	0.22	0.55	—	0.55					
	3.0	—	0.22	0.55	—	0.55					

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit	
			V _{CC} (V)	Min	Typ.	Max	Min		Max
Input leakage current	I _{IN}	V _{IN} = 5.5 V or GND	0 to 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 to 5.5	—	—	1	—	10	μA

AC Electrical Characteristics (Unless otherwise specified Input, t_r = t_f = 3 ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 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	1.80 ± 0.15	2.0	9.1	15.0	2.0	15.6	ns
			2.5 ± 0.2	1.0	5.0	9.0	1.0	9.5	
			3.3 ± 0.3	1.0	3.7	6.3	1.0	6.5	
			5.0 ± 0.5	0.5	3.1	5.2	0.5	5.5	
		C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.5	4.4	7.2	1.5	7.5	
			5.0 ± 0.5	0.5	3.7	5.9	0.5	6.2	
Input capacitance	C _{IN}	—	0 to 5.5	—	4	—	—	pF	
Power dissipation capacitance	C _{PD}	(Note 3)	3.3	—	15	—	—	—	pF
			5.5	—	20	—	—	—	pF

Note 3: CPD is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

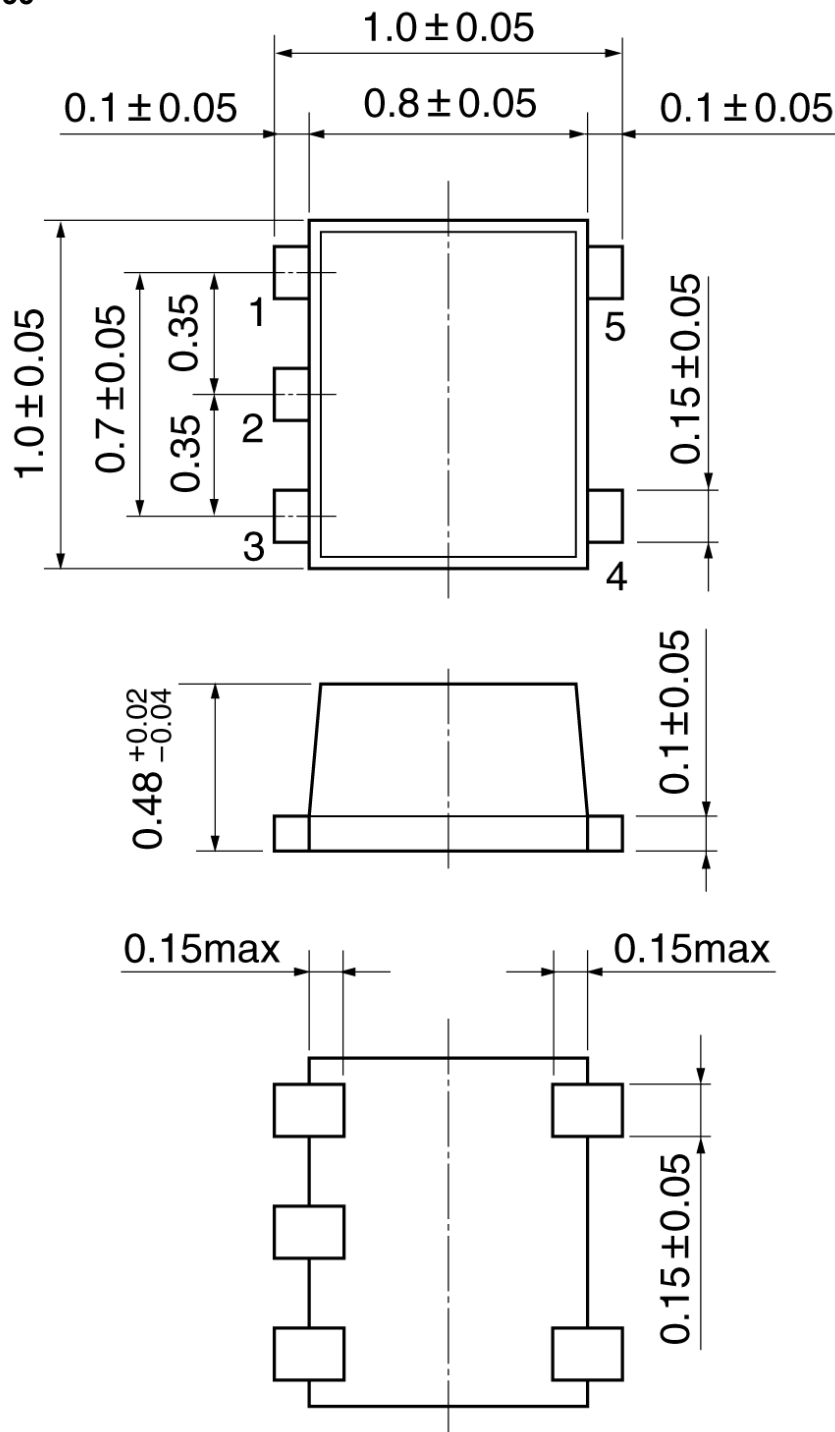
Average operating current can be obtained by the equation.

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

Package Dimensions

SON5-P-0.35

Unit: mm



Weight: 0.001 g (typ.)

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