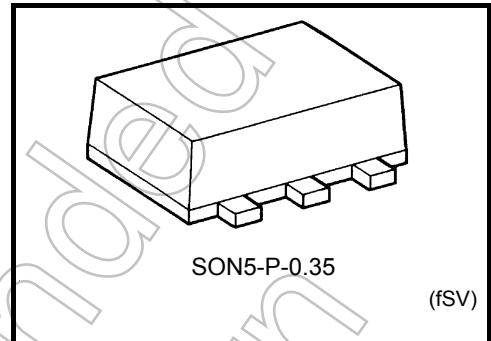


TC7SH14FS

Schmitt Inverter

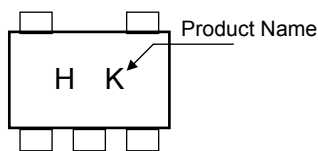
Features

- High speed operation : $t_{pd} = 5.5 \text{ ns (typ.)}$
at $V_{CC} = 5 \text{ V}$, $C_L = 15 \text{ pF}$
- Low power dissipation : $I_{CC} = 2 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- Wide operating voltage range: $V_{CC} = 2 \text{ to } 5.5 \text{ V}$
- High noise immunity : $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (min)}$
- 5.5-V tolerant input

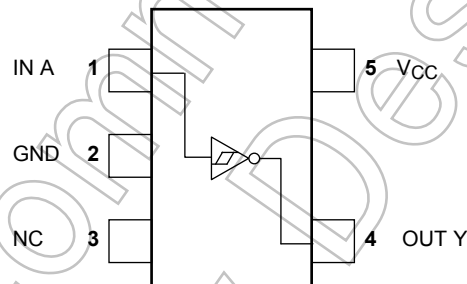


Weight : 0.001 g (Typ.)

Marking



Pin Assignment (top view)



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

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5 to 7	V
DC input voltage	V_{IN}	-0.5 to 7	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20 (Note 1)	mA
DC output current	I_{OUT}	± 25	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	50	mW
Storage temperature	T_{stg}	-65 to 150	$^\circ\text{C}$

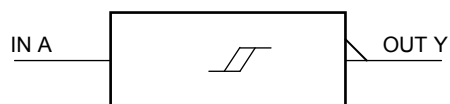
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.)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

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

Start of commercial production
2003-08

IEC Logic Symbol



Truth Table

A	Y
L	H
H	L

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 5.5	V
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

Not Recommended for New Design

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	
Input voltage	Positive threshold voltage	V _P	—	3.0	—	—	2.20	—	2.20	V	
				4.5	—	—	3.15	—	3.15		
				5.5	—	—	3.85	—	3.85		
	Negative threshold voltage	V _N	—	3.0	0.90	—	—	0.90	—	V	
				4.5	1.35	—	—	1.35	—		
				5.5	1.65	—	—	1.65	—		
Hysteresis voltage		V _H	—	3.0	0.30	—	1.20	0.30	1.20	V	
4.5	0.40			—	1.40	0.40	1.40				
5.5	0.50			—	1.60	0.50	1.60				
Output voltage	High level	V _{OH}	V _{IN} = V _{IL}	I _{OH} = -50 μA	2.0	1.9	2.0	—	1.9	—	V
					3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—		
				I _{OH} = -4 mA	3.0	2.58	—	—	2.48	—	
					4.5	3.94	—	—	3.80	—	
				Low level	V _{OL}	V _{IN} = V _{IH}	I _{OL} = 50 μA	2.0	—	0.0	
	3.0	—	0.0					0.1	—	0.1	
	I _{OL} = 4 mA	3.0	—				—	0.36	—	0.44	
		4.5	—				—	0.36	—	0.44	
	Input leakage current		I _{IN}	V _{IN} = 5.5 V or GND	0 to 5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	2.0	—	20.0	μA	

AC 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)	C _L (pF)	Min	Typ.	Max	Min	Max		
Propagation delay time	t _{PLH} t _{PHL}	3.3 ± 0.3	15	—	8.3	12.8	1.0	15.0	ns	
			50	—	10.8	16.3	1.0	18.5		
		5.0 ± 0.5	15	—	5.5	8.6	1.0	10.0		
			50	—	7.0	10.6	1.0	12.0		
Input capacitance		C _{IN}			—	4	10	—	10	pF
Power dissipation capacitance		C _{PD}	(Note 2)		—	14	—	—	—	pF

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

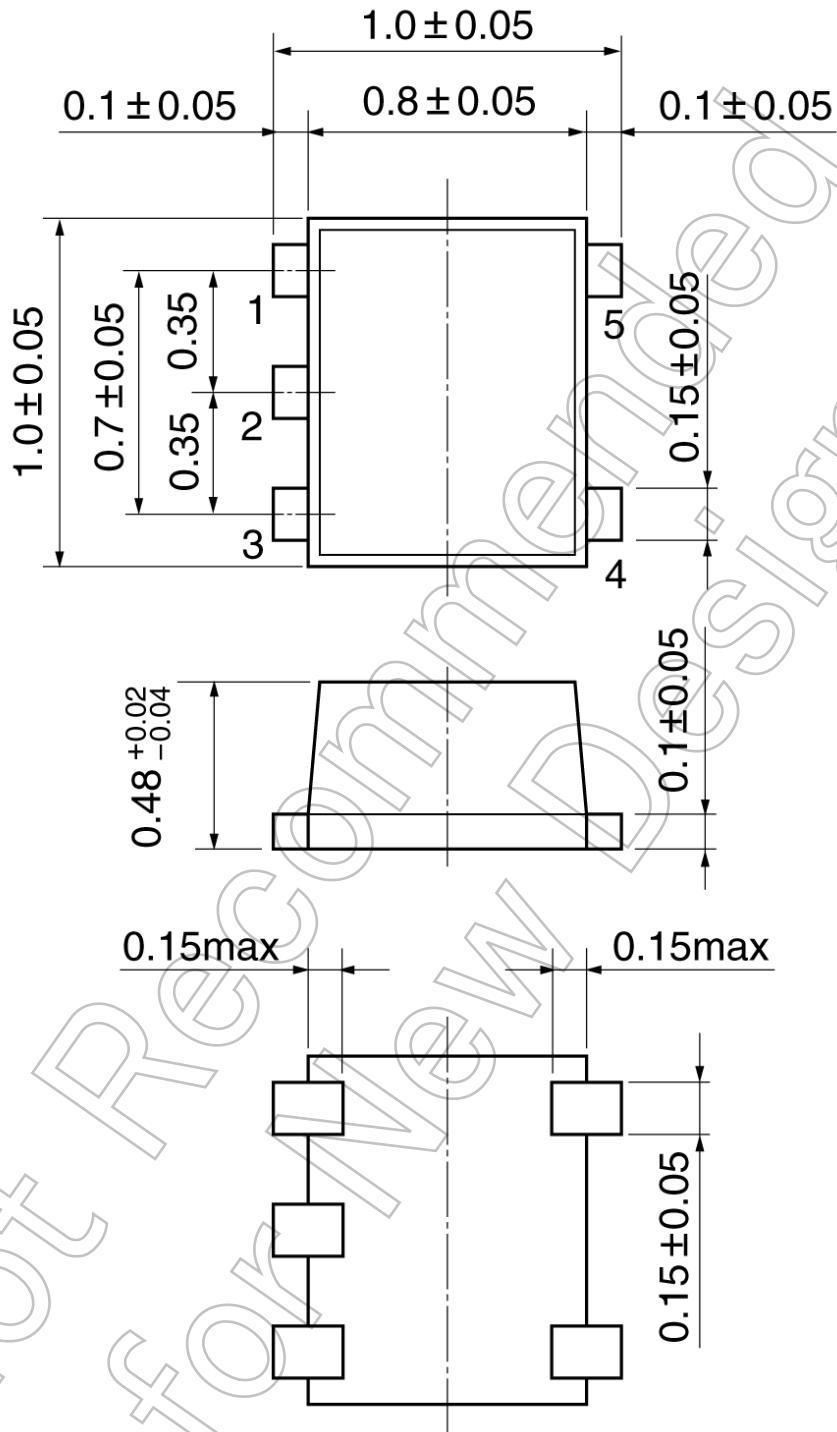
Average operating current can be obtained by the equation.

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

Package Dimensions

SON5-P-0.35

Unit: mm



Weight: 0.001 g (typ.)

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