

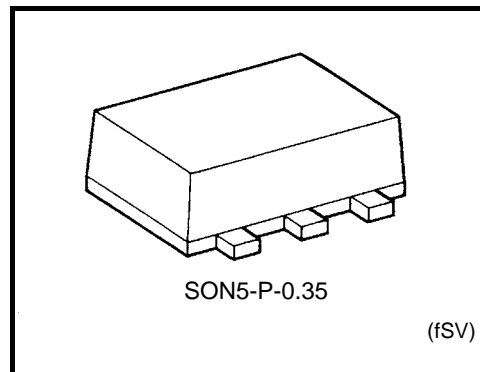
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7SH14FS

## SCHMITT INVERTER

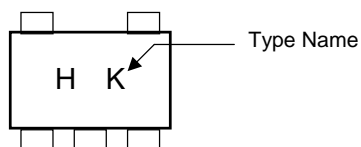
### Features

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

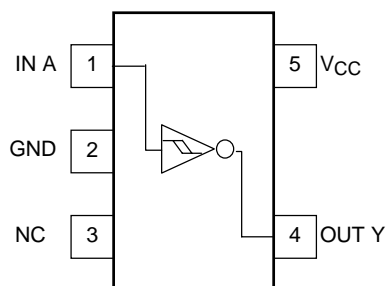


Weight : 0.001 g (Typ.)

### Marking (top view)



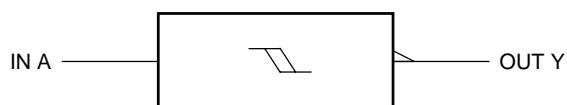
### • Pin Assignment



## Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V <sub>CC</sub>	-0.5~7.0	V
DC input voltage	V <sub>IN</sub>	-0.5~7.0	V
DC output voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> + 0.5	V
Input diode current	I <sub>IK</sub>	-20	mA
Output diode current	I <sub>OK</sub>	±20	mA
DC output current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /ground current	I <sub>CC</sub>	±50	mA
Power dissipation	P <sub>D</sub>	50	mW
Storage temperature	T <sub>stg</sub>	-65~150	°C

## Logic Diagram



## Truth Table

A	Y
L	H
H	L

## Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	2.0~5.5	V
Input voltage	V <sub>IN</sub>	0~5.5	V
Output voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	-40~85	°C

**Electrical Characteristics**
**DC Characteristics**

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit	
					V <sub>CC</sub> (V)	Min	Typ.	Max	Min		Max
Positive Threshold voltage	V <sub>P</sub>	—	—	3.0	—	—	2.20	—	2.20	V	
				4.5	—	—	3.15	—	3.15		
				5.5	—	—	3.85	—	3.85		
Negative Threshold voltage	V <sub>N</sub>	—	—	3.0	0.90	—	—	0.90	—	V	
				4.5	1.35	—	—	1.35	—		
				5.5	1.65	—	—	1.65	—		
Hysteresis voltage	V <sub>H</sub>	—	—	3.0	0.30	—	1.20	0.30	1.20	V	
				4.5	0.40	—	1.40	0.30	1.40		
				5.5	0.30	—	1.60	0.30	1.60		
High-level output voltage	V <sub>OH</sub>	—	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OH</sub> = -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 <sub>OH</sub> = -4 mA	3.0	2.58	—	—	2.48	—	
					4.5	3.94	—	—	3.80	—	
Low-level output voltage	V <sub>OL</sub>	—	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OL</sub> = 50 μA	2.0	—	0.0	0.1	—	0.1	V
					3.0	—	0.0	0.1	—	0.1	
					4.5	—	0.0	0.1	—	0.1	
				I <sub>OL</sub> = 4 mA	3.0	—	—	0.36	—	0.44	
					4.5	—	—	0.36	—	0.44	
Input leakage current	I <sub>IN</sub>	—	V <sub>IN</sub> = 5.5 V or GND		0~5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I <sub>CC</sub>	—	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	2.0	—	20.0	μA

**AC Characteristics (Input:  $t_r = t_f = 3 \text{ ns}$ )**

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit
			V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	t <sub>pLH</sub> t <sub>pHL</sub>	—	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 <sub>IN</sub>	—	—		—	4	10	—	10	pF
Power dissipation capacitance	C <sub>PD</sub>	—	(Note)		—	14	—	—	—	pF

Note: C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

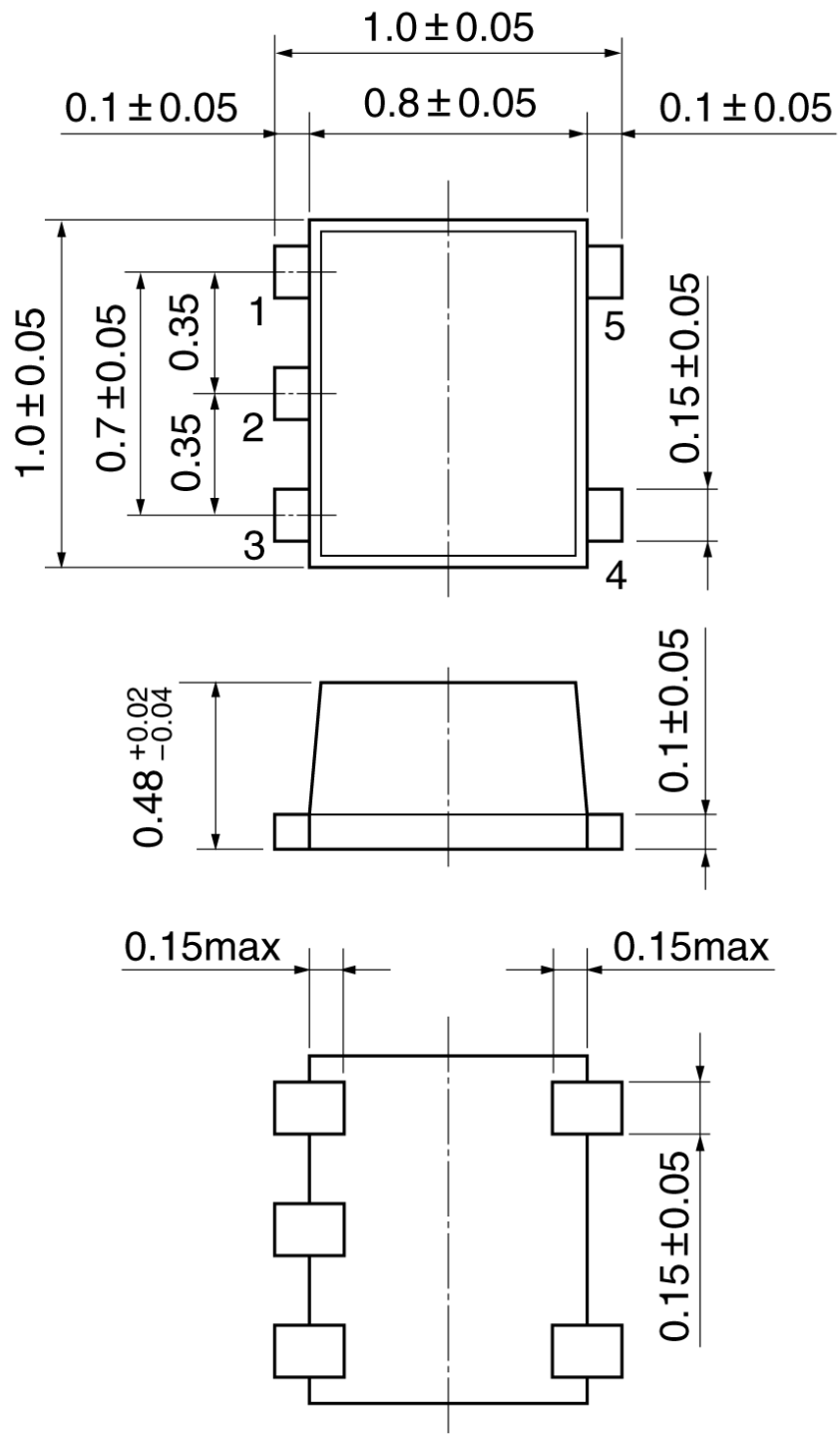
Average operating current can be obtained by the equation:

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

Package Dimensions

SON5-P-0.35

Unit:mm



Weight: 0.001 g (typ.)

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