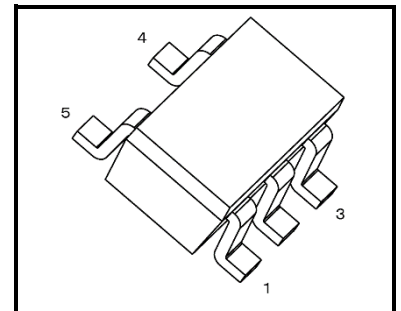


## TC4S584F

### Schmitt Trigger

TC4S584F is the one circuit inverter having the Schmitt trigger function at the input terminal. That is, since the circuit threshold level voltage at the leading and trailing edges of input waveform are different ( $V_P$ ,  $V_N$ ), the TC4S584F can be used in the broad range applications, including line receivers, waveform shaping circuit, astable multivibrators, and monostable multivibrators.



Weight  
SSOP5-P-0.95 : 0.016 g (typ.)

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

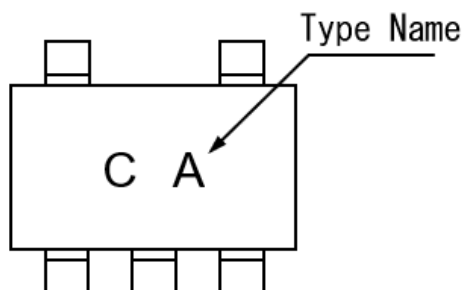
Characteristics	Symbol	Rating	Unit
DC supply voltage	$V_{DD}$	$V_{SS} - 0.5$ to $V_{SS} + 20$	V
Input voltage	$V_{IN}$	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
Output voltage	$V_{OUT}$	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
DC input current	$I_{IN}$	$\pm 10$	mA
Power dissipation	$P_D$	200	mW
Operating temperature range	$T_{opr}$	-40 to 85	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-65 to 150	$^\circ\text{C}$
Lead temperature (10 s)	$T_L$	260	$^\circ\text{C}$

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

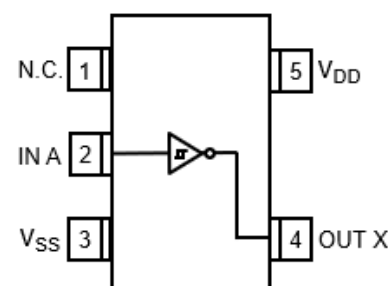
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within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

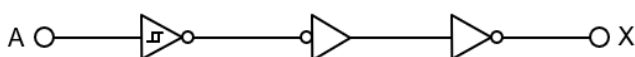
### Marking



### Pin Assignment



### Logic Diagram



Start of commercial production  
1988-05

### Operating Ranges (V<sub>SS</sub> = 0 V)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
DC supply voltage	V <sub>DD</sub>	—	3	—	18	V
Input voltage	V <sub>IN</sub>	—	0	—	V <sub>DD</sub>	V

### Static Electrical Characteristics (V<sub>SS</sub> = 0 V)

Characteristics	Symbol	Test Condition	V <sub>DD</sub> (V)	-40°C		25°C			85°C		Unit	
				Min	Max	Min	Typ.	Max	Min	Max		
High-level output voltage	V <sub>OH</sub>	I <sub>OUT</sub>   < 1 μA V <sub>IN</sub> = V <sub>SS</sub>	5	4.95	—	4.95	5.00	—	4.95	—	V	
			10	9.95	—	9.95	10.00	—	9.95	—		
			15	14.95	—	14.95	15.00	—	14.95	—		
Low-level output voltage	V <sub>OL</sub>	I <sub>OUT</sub>   < 1 μA V <sub>IN</sub> = V <sub>DD</sub>	5	—	0.05	—	0	0.05	—	0.05	V	
			10	—	0.05	—	0	0.05	—	0.05		
			15	—	0.05	—	0	0.05	—	0.05		
Output high current	I <sub>OH</sub>	V <sub>IN</sub> = V <sub>SS</sub>	V <sub>OH</sub> = 4.6 V	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
			V <sub>OH</sub> = 2.5 V	5	-2.5	—	-2.1	-4.0	—	-1.7	—	
			V <sub>OH</sub> = 9.5 V	10	-1.5	—	-1.3	-2.2	—	-1.1	—	
			V <sub>OH</sub> = 13.5 V	15	-4.0	—	-3.4	-9.0	—	-2.8	—	
Output low current	I <sub>OL</sub>	V <sub>IN</sub> = V <sub>DD</sub>	V <sub>OL</sub> = 0.4 V	5	0.61	—	0.51	1.5	—	0.42	—	mA
			V <sub>OL</sub> = 0.5 V	10	1.5	—	1.3	3.8	—	1.1	—	
			V <sub>OL</sub> = 1.5 V	15	4.0	—	3.4	15.0	—	2.8	—	
Positive trigger threshold voltage*	V <sub>P</sub>	V <sub>OUT</sub> = 0.5 V V <sub>OUT</sub> = 1.0 V V <sub>OUT</sub> = 1.5 V	5	19.5	3.65	2.05	2.9	3.35	2.05	3.75	V	
			10	4.3	7.1	4.5	5.9	7.1	4.7	7.2		
			15	6.9	10.7	7.1	9.0	10.6	7.1	10.8		
Negative trigger threshold voltage*	V <sub>N</sub>	V <sub>OUT</sub> = 4.5 V V <sub>OUT</sub> = 9.0 V V <sub>OUT</sub> = 13.5 V	5	1.05	2.75	1.1	2.1	2.6	0.95	2.65	V	
			10	2.1	4.9	2.2	3.5	4.7	2.0	4.8		
			15	3.2	7.0	3.3	5.0	6.8	3.1	6.9		
Hysteresis voltage*	V <sub>H</sub>	—	5	0.1	1.35	0.4	0.75	1.3	0.4	1.50	V	
			10	1.7	3.2	1.8	2.4	3.2	1.7	3.4		
			15	3.1	4.8	3.2	4.0	4.8	3.2	4.9		
Input current	"H" level	I <sub>IH</sub>	V <sub>IH</sub> = 18 V	18	—	0.1	—	10 <sup>-5</sup>	0.1	—	1.0	μA
	"L" level	I <sub>IL</sub>	V <sub>IL</sub> = 0 V	18	—	-0.1	—	-10 <sup>-5</sup>	-0.1	—	-1.0	
Quiescent supply current	I <sub>DD</sub>	V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	5	—	1	—	0.001	1	—	7.5	μA	
			10	—	2	—	0.002	2	—	15.0		
			15	—	4	—	0.004	4	—	30.0		

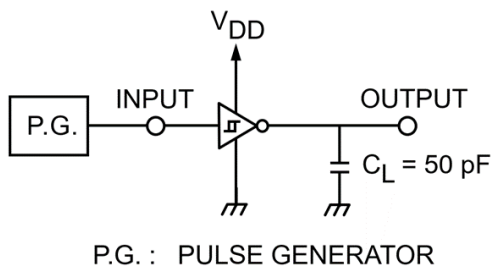
Note: Values are different to TC4584BP, TC4584BF marked\* (V<sub>P</sub>, V<sub>N</sub>, V<sub>H</sub>).

## Switching Characteristics (Ta = 25°C, Vss = 0 V, CL = 50 pF)

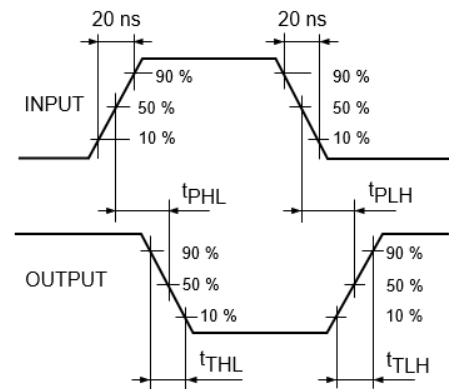
Characteristics	Symbol	Test Condition	VDD (V)	Min	Typ.	Max	Unit
			5	10	15	—	—
Output transition time	t <sub>TLH</sub>	—	5	—	80	200	ns
	t <sub>THL</sub>		10	—	50	100	
			15	—	40	80	
Propagation delay time	t <sub>pLH</sub>	—	5	—	170	300	ns
	t <sub>pHL</sub>		10	—	80	160	
			15	—	60	120	
Input capacitance	C <sub>IN</sub>	—	—	5	7.5	pF	

## Circuit and Waveform for Measurement of Dynamic Characteristics

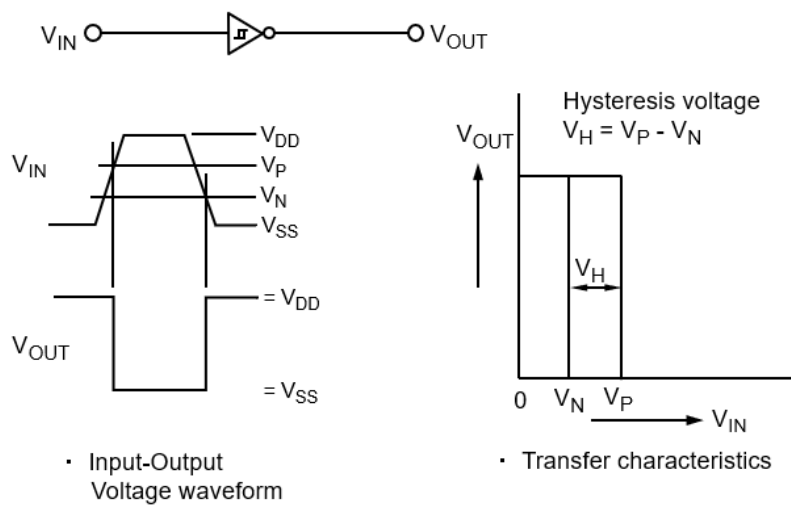
### Circuit



### Waveform



## Input-Output Voltage Characteristics





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